THE FOUNDRY

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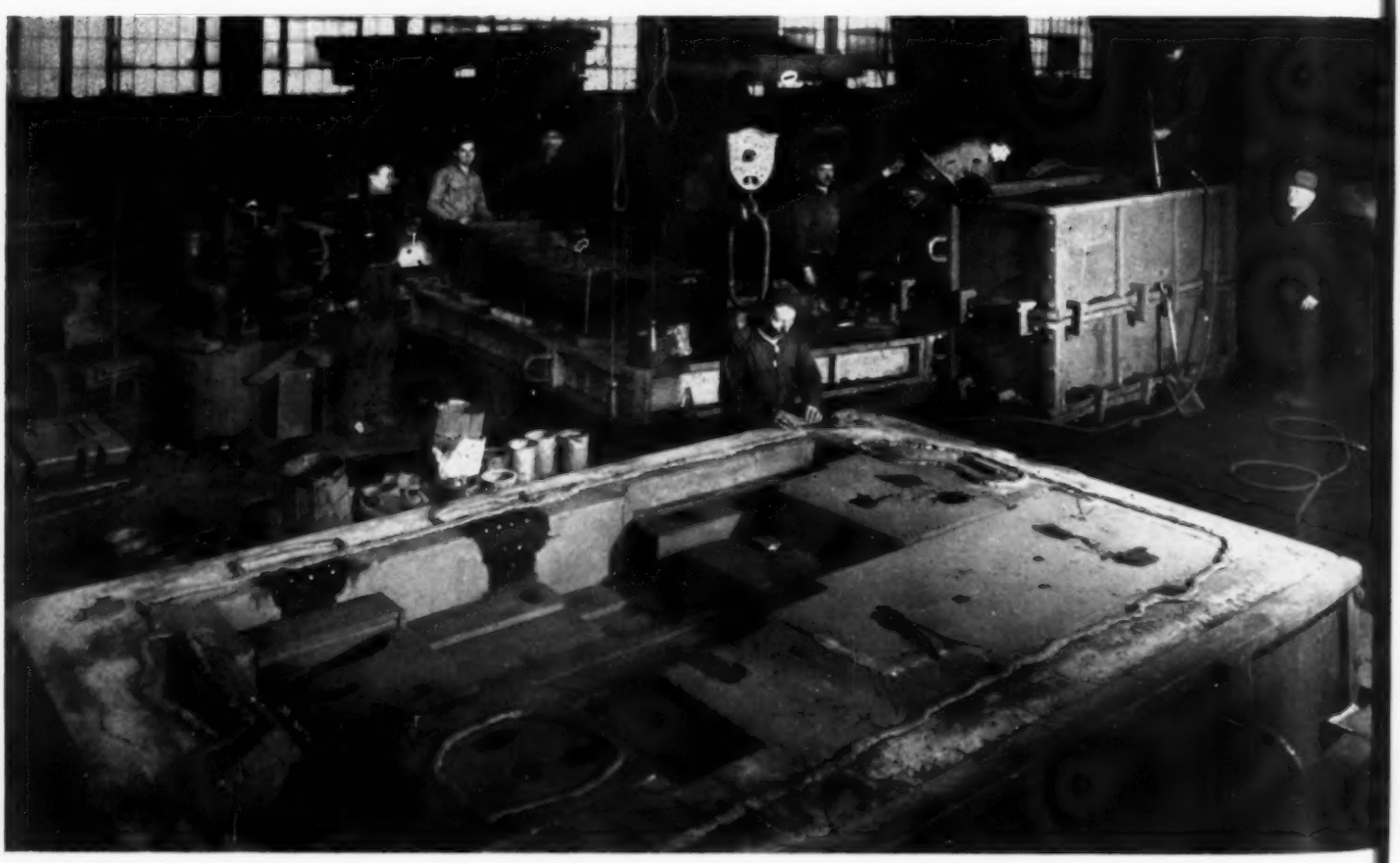
WHERE YOU CAN'T AFFORD TO *Take a Chance!*

TEN tons of Linoil core sand seems like a huge amount for one casting, but James V. Proshek, president of The Cuyahoga Foundry Company, says it isn't. He says it's cheaper than taking a chance when the mold represents many hours of foundry labor and the weight of the iron poured is nine thousand pounds. Pictures show drag, cope, a closed mold, and the casting. 120 cores in assembly, 89 foundry hours.

"I know how Linoil is going to work when I plan a mold," says Mr. Proshek, "I know when I pour a mold the casting will be sound. We all gamble a little I suppose but it's foolish to risk a heavy casting to save a little on binder. I've used Linoil nineteen years."



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THE FOUNDRY

EDITORIAL

Convention Permits Study of Industry's Part in Defense

THE forty-fifth annual convention of the American Foundrymen's Association, to be held in New York, May 12 to 15, will permit the management of a basic industry to study at close range the pressing problems connected with the production of castings of all types in sufficient quantities to meet the war effort of the United States. While a review of recent technical progress always provides an essential part of any annual convention, and will not be overlooked this year, the 1941 gathering must be more concerned with the multitude of problems which lie immediately ahead. During the coming 12 months, the various branches of the foundry industry will be called upon to provide enormous tonnages of castings which must be produced under most trying conditions.

In the course of the past 10 or 15 years the foundry industry has made tremendous progress in developing castings capable of meeting an ever widening field of industrial and commercial applications. Research of many individual companies and the extended co-operative efforts of the members of foundry groups have been translated into a wide variety of cast products possessing properties far beyond the maximums which were available during the world war. Individual companies have standardized practices to permit continuous production of a uniform, high quality product. To a lesser extent, this trend toward the standardization of practice has filtered throughout the various branches of the industry, so that exceptional uniformity of product now is possible. Much of the development toward standardization has been based upon the availability of an abundance of all raw materials, foundry supplies and the most modern equipment needed for the particular casting operation.

Today, the strain resulting from preparation for war has changed this situation entirely. Already certain materials, formerly considered essential in the production of various types of castings, no longer are obtainable or at best are exceedingly difficult to secure. Other important materials in the production of castings are reported rather scarce, and in the not too distant future may be added to the priority lists where distribution and consumption will be controlled. As the result of scarcity and control, the foundry industry is facing entirely new problems, where practices and perhaps new products may be required.

Everything considered, the New York convention of the American Foundrymen's Association could not have been scheduled for a better time. The annual meeting in May provides a gathering of leadership, where the ramifications of the situation may be studied and plans developed for future action as the pressure of production and procurement of war materials increases. Consideration may be given to the application of substitutes in practices within the industry.

The annual convention marks a year of unusual progress in the work of the American Foundrymen's Association. Since the meeting at Chicago just a year ago, the Chesapeake and the Western Michigan chapters have been organized, thus making a total of 20 chapters now operating under the A.F.A. banner for the benefit of members in districts scattered throughout the United States and Canada. Interest continues to develop in other sections and further additions to the family may be expected during the coming year. The campaign for members, organized and placed in operation so successfully at the 1940 convention and exhibition, has been carried on throughout the year with most satisfactory results. Through the excellent co-operative work of the various chapter membership committees and the personnel of the national office, the total membership has reached the highest point in the history of the association.

During the year, the association has continued to render valuable service to its members, as well as to the entire foundry industry. One of the important contributions has been the publication of additional codes by the Industrial Hygiene Codes committee of the association. The cupola research project has been officially launched, and undoubtedly will provide material of exceptional value to the gray iron foundry industry in the years to come. Excellence of the technical program scheduled for the New York meeting is ample proof of the valuable work of the many association committees and the efficient leadership of the national office.

President Shannon, Vice President Simpson, the board of directors, and the men and women in the national office should take great pride in the progress which has been made during the past year.

Frank G. Steinebach

Editor

National Defense

to keynote A.F.A. Convention in

New York

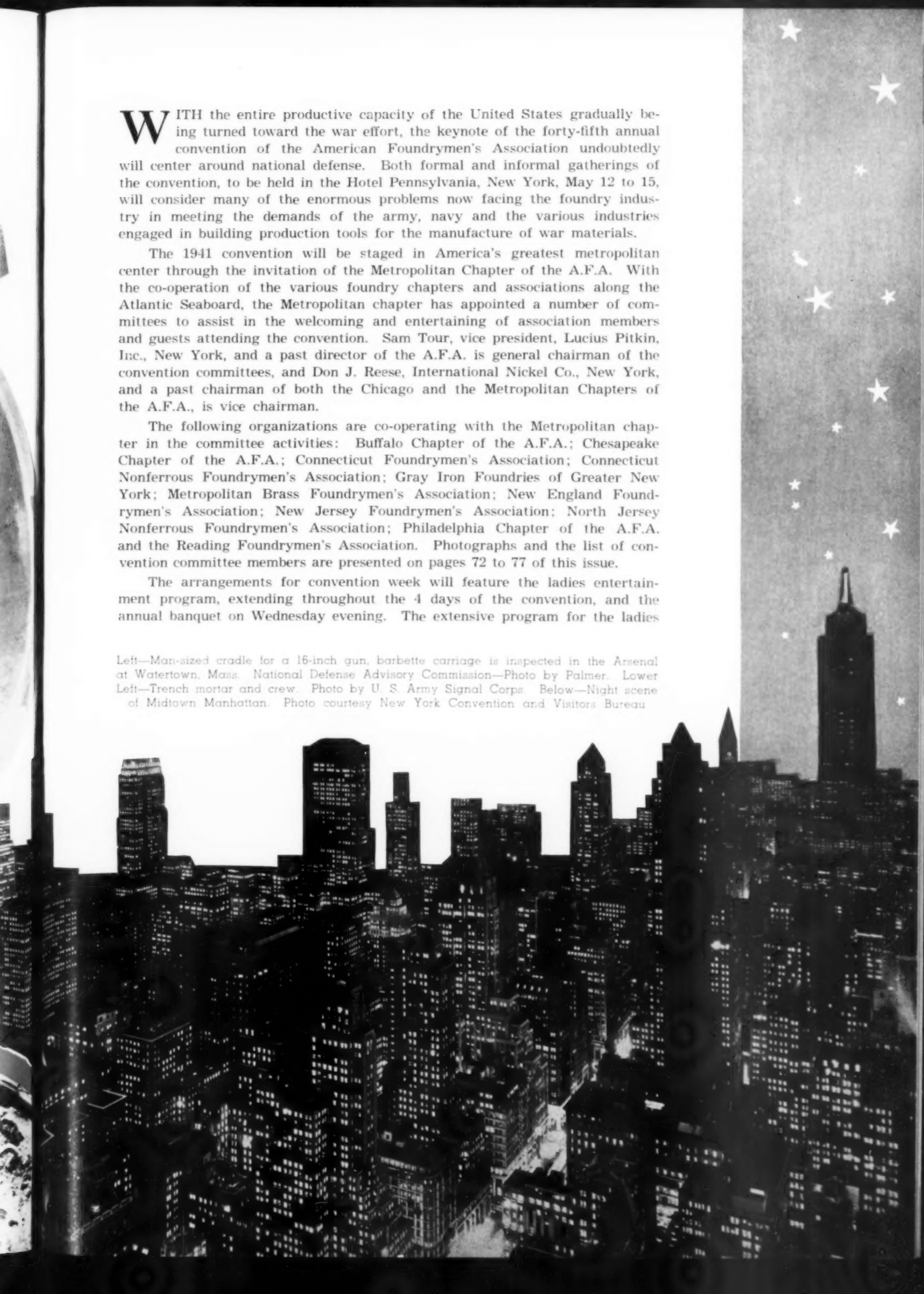
WITH the entire productive capacity of the United States gradually being turned toward the war effort, the keynote of the forty-fifth annual convention of the American Foundrymen's Association undoubtedly will center around national defense. Both formal and informal gatherings of the convention, to be held in the Hotel Pennsylvania, New York, May 12 to 15, will consider many of the enormous problems now facing the foundry industry in meeting the demands of the army, navy and the various industries engaged in building production tools for the manufacture of war materials.

The 1941 convention will be staged in America's greatest metropolitan center through the invitation of the Metropolitan Chapter of the A.F.A. With the co-operation of the various foundry chapters and associations along the Atlantic Seaboard, the Metropolitan chapter has appointed a number of committees to assist in the welcoming and entertaining of association members and guests attending the convention. Sam Tour, vice president, Lucius Pitkin, Inc., New York, and a past director of the A.F.A. is general chairman of the convention committees, and Don J. Reese, International Nickel Co., New York, and a past chairman of both the Chicago and the Metropolitan Chapters of the A.F.A., is vice chairman.

The following organizations are co-operating with the Metropolitan chapter in the committee activities: Buffalo Chapter of the A.F.A.; Chesapeake Chapter of the A.F.A.; Connecticut Foundrymen's Association; Connecticut Nonferrous Foundrymen's Association; Gray Iron Foundries of Greater New York; Metropolitan Brass Foundrymen's Association; New England Foundrymen's Association; New Jersey Foundrymen's Association; North Jersey Nonferrous Foundrymen's Association; Philadelphia Chapter of the A.F.A. and the Reading Foundrymen's Association. Photographs and the list of convention committee members are presented on pages 72 to 77 of this issue.

The arrangements for convention week will feature the ladies entertainment program, extending throughout the 4 days of the convention, and the annual banquet on Wednesday evening. The extensive program for the ladies

Left—Man-sized cradle for a 16-inch gun, barbette carriage is inspected in the Arsenal at Watertown, Mass. National Defense Advisory Commission—Photo by Palmer. Lower Left—Trench mortar and crew. Photo by U. S. Army Signal Corps. Below—Night scene of Midtown Manhattan. Photo courtesy New York Convention and Visitors Bureau



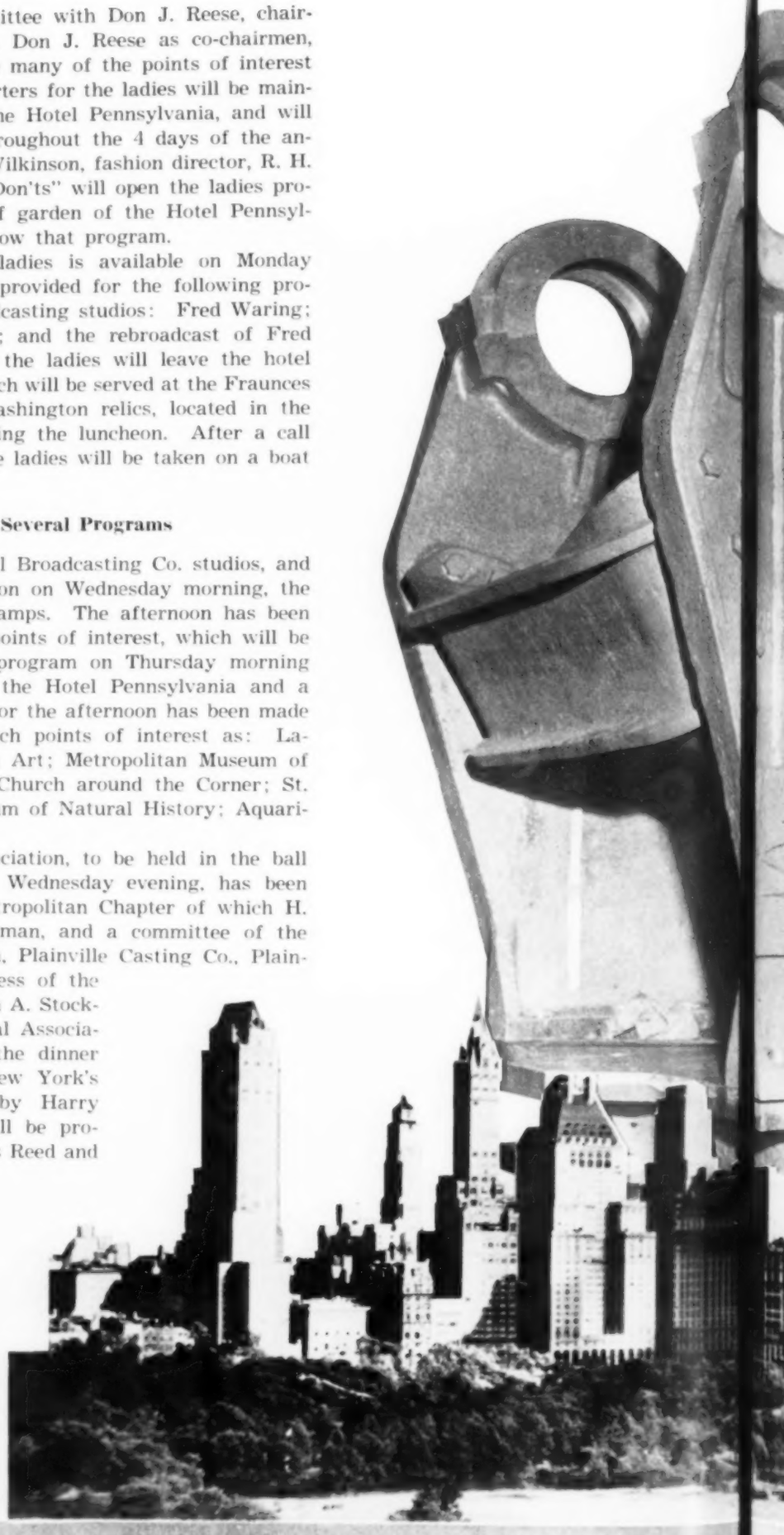
entertainment, arranged by a committee with Don J. Reese, chairman, and Mrs. Sam Tour and Mrs. Don J. Reese as co-chairmen, will permit the visiting ladies to see many of the points of interest in New York. Registration headquarters for the ladies will be maintained in conference room two of the Hotel Pennsylvania, and will be open from 9 a.m. on Monday throughout the 4 days of the annual meeting. A talk by Charlotte Wilkinson, fashion director, R. H. Macy & Co., on "Fashion Do's and Don'ts" will open the ladies program at 2 p.m. Monday, in the roof garden of the Hotel Pennsylvania. A tea and reception will follow that program.

An optional program for the ladies is available on Monday evening with complimentary tickets provided for the following programs at N.B.C. and Columbia broadcasting studios: Fred Waring; Voice of Firestone; Guy Lombardo; and the rebroadcast of Fred Waring. Tuesday morning at 9:30 the ladies will leave the hotel for a tour of lower Manhattan and lunch will be served at the Fraunces tavern. The museum of George Washington relics, located in the same building will be visited following the luncheon. After a call at the New York stock exchange, the ladies will be taken on a boat trip around Manhattan island.

Ladies Have Choice of Several Programs

Following a tour of the National Broadcasting Co. studios, and a visit at the Helena Rubinstein salon on Wednesday morning, the ladies will have luncheon at Longchamps. The afternoon has been left open for shopping or visits to points of interest, which will be suggested by the committee. The program on Thursday morning includes a tour of the kitchens of the Hotel Pennsylvania and a visit to Gimbel Bros. The program for the afternoon has been made optional with suggested visits to such points of interest as: La-Guardia airport; Museum of Modern Art; Metropolitan Museum of Art; Empire State Building; Little Church around the Corner; St. Patrick's Cathedral; American Museum of Natural History; Aquarium; Statue of Liberty.

The annual banquet of the association, to be held in the ball room of the Hotel Pennsylvania on Wednesday evening, has been arranged by a committee of the Metropolitan Chapter of which H. C. Seidel, Penn-Rillton Co., is chairman, and a committee of the A.F.A. of which Henry S. Washburn, Plainville Casting Co., Plainville, Conn., is chairman. The address of the evening will be presented by Dr. Allen A. Stockdale of the speaker's bureau, National Association of Manufacturers. Music for the dinner hour will be supplied by one of New York's well known orchestras conducted by Harry Lefcourt. Further entertainment will be provided during the dinner hour by Doris Reed and Alfredo Chigi, soloists. A special feature has been provided for the program which should prove of unusual interest to all members of the association.



Right—New York skyline from Central Park. Photo New York Convention and Visitors Bureau. Center above—Finishing Operation on trunnion bearing for an 8-inch gun railway carriage. National Defense Advisory Commission — Photo by Palmer

Following the dinner and the program, a reception and dance will be held in the Georgian room of the Hotel Pennsylvania with Harry Lefcourt's orchestra furnishing the music.

The plant visitation committee under the chairmanship of K. V. Wheeler, American Steel Castings Co., Newark, N. J., has arranged for two formal plant visitations during the convention week. On Tuesday, May 13, the Otis Elevator Co., Yonkers, N. Y., will be open for visitation and on Wednesday, May 14, convention visitors may inspect the plant of the Nassau Smelting & Refining Co., Tottenville, N. Y. It is possible that certain other plants in the district will be open for individual visits during the convention week providing proper arrangements are made with the plant visitation committee. Due to the fact that most plants are working on defense orders, many plants cannot be visited, but where inspection is possible, proof of citizenship and suitable identification generally will be necessary.

An extensive program of technical sessions which includes a wide variety of interesting and valuable papers covering practices in all four branches of the industry has been prepared by the program committees and the national headquarters staff. In addition to papers dealing with the technical and practical phases of gray iron, malleable iron, steel and nonferrous castings production, and the usual shop and lecture courses which have become one of the most important parts of any foundry convention program, special emphasis is being given this year to sessions devoted to the discussion of the management phases of the industry.

Among the papers to be included at the management sessions are the following: "The Foreman in the National Defense Program" by Glenn Gardiner, Forstmann Woolen Co., Passaic, N. J., and the Elliott Service Co., New York; "Practical Time Study Measurement for Foundry Operation" by Phil Carroll Jr., New York; "Job Evaluation and Merit Rating" by A. L. Kress, National Metal Trades Association, Chicago; and "Apprentice Training and Defense Work" by W. F. Patterson, Chief, Apprentice Training, Division of Labor Standards, Washington. The list of speakers at the foundry safety and hygiene session on Monday afternoon will include D. E. Cummings, director, Industrial Hygiene, University of Colorado, Denver; Roger Williams, assistant director, Inspection and Safety Department, State Insurance Fund, New York; and James R. Allan, International Harvester Co., Chicago.

The annual business meeting of the association, to be held Wednesday, May 14 at 10:30 a.m., will provide one of the high lights of the convention week. The program for that session will include the presentation of the gold medals of the association to four outstanding members, as is described on page 78 of this issue, the report of President

(*Please turn to page* 159)

NATIONAL Foundry Week activities which begin at 9 a.m. on Monday, May 12 and extend through Thursday afternoon, May 15 will be of great interest to every one connected with the foundry industry. The following tentative program indicates the schedule of technical meetings, shop courses, roundtable luncheons, and dinners, all of which will be held in Hotel Pennsylvania.

Monday, May 12

9:00 a.m.—Registration

10:00 a.m.—Annual Sand Control Shop Course—Session 1

Chairman, D. Frank O'Connor, Walworth Co., Boston.
Discussion Leader, H. M. St. John, Crane Co., Chicago.
Subject—*Nonferrous Foundry Sand Control.*

10:00 a.m.—Foundry Refractories

Chairman, J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala.
Some Observations on Malleable Furnace Refractories, by J. A. Kayser, Laclede-Christy Clay Products Co., St. Louis.
Firestone as a Cupola Refractory, by F. J. Wurscher, Acme Steel & Malleable Works, Buffalo.
Electric Furnace Refractories, by C. A. Brashares, Harbison-Walker Refractories Co., Pittsburgh.

11:30 a.m.—Annual Gray Iron Foundry Shop Practice Course—Session 1

Chairman, Norman Wigley, Eaton Foundry division, Eaton Mfg. Co., Detroit.
Discussion Leader, Donald J. Reese, International Nickel Co., New York.
Subject—*Cupola Practice and Equipment.*

2:00 p.m.—Malleable Founding

Chairman, D. P. Forbes, Gunite Foundries Corp., Rockford, Ill. Co-chairman, C. F. Joseph, Saginaw Malleable division General Motors Corp., Saginaw, Mich.
Graphitization of Cementite in Cupola White Iron, by N. A. Ziegler, W. L. Meinhart and A. J. Deacon, Crane Co., Chicago.
The Velocity of Conversion of Austenite to Ferrite and Cementite, by H. A. Schwartz and M. K. Barnett, National Malleable & Steel Castings Co., Cleveland.
Flame Hardening of Malleable Iron, by Stephen Smith, Air Reduction Sales Co., New York.

2:00 p.m.—Nonferrous Founding

Chairman, W. J. Laird, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Co-chairman, Wm. Romanoff, H. Kramer & Co., Chicago.
Gating and Risering Nonferrous Castings, by R. R. Clarke, General Electric Co., Erie, Pa.
An Experiment in Efficient Crucible Melting, by G. K. Eggleston, Barnes Mfg. Co., Mansfield.
Effects of Furnace Atmospheres in Nonferrous Melting, by J. M. Kelly, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

2:00 p.m.—Foundry Safety and Hygiene

Chairman, E. H. Ballard, General Electric Co., West Lynn, Mass.
Speakers: D. E. Cummings, director, division of industrial hygiene, department of medicine, University of Colorado, Denver; Roger Williams, assistant director, inspection & safety service department, The State Insurance Fund of New York, and Jas. R. Allan, assistant manager, industrial engineering & construction department, International Harvester Co., Chicago, and chairman of A.F.A. Committee on Accident Prevention and Hygiene.

3:00 p.m.—Chapter Delegate Conference

Presiding, H. S. Simpson, vice president, A.F.A.

4:00 p.m.—Foundry Costs

Chairman, R. L. Lee, The Liberty Foundry, Inc., Wauwatosa, Wis.
Variable Budget in The Foundry, by E. C. Bumke, Oliver Farm Equipment Co., South Bend, Ind.
Cost Committee Report on Classification of Cost Divisions.

4:30 p.m.—Annual Lecture Course—Session 1

Chairman, H. M. St. John, Crane Co., Chicago.
Core Practices and Theories.
Lecturer, H. W. Dietert, Harry W. Dietert Co., Detroit.

7:00 p.m.—Chapter Officers' Dinner

7:00 p.m.—Engineering Instructors' Dinner

Presiding, F. G. Seiling, International Nickel Co., New York, and chairman, A.F.A. committee on co-operation with engineering schools.
A University Course in Foundry Control Methods, by Fulton Holtby and H. F. Scobie, University of Minnesota, Minneapolis.
The Foundry Industry and the Engineering Graduate, by R. F. Harrington, Hunt-Spiller Mfg. Co., Boston.

Tuesday, May 13

9:30 a.m.—Annual Sand Shop Control Course—Session 2

Chairman, J. H. Lansing, Malleable Founders' Society, Cleveland.
Discussion Leader, D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.
Subject—*Malleable Foundry Sand Control.*

10:30 a.m.—Nonferrous Founding

Chairman, Joseph Sully, Sully Brass Foundry, Ltd., Toronto. Co-chairman, E. F. Hess, Ohio Injector Co., Wadsworth, O.
Magnesium Foundry Alloy Practice, by M. E. Brooks and A. W. Winston, Dow Chemical Co., Midland, Mich.
Silicon-Iron Bronzes, Their Foundry Qualities and Physical Constants, by E. G. Jennings and Harold J. Roast, Canadian Bronze Co., Montreal.
Aluminum-Copper-Magnesium-Zinc Casting Alloys, by L. W. Eastwood and L. W. Kempf, Aluminum Co. of America, Cleveland.

10:30 a.m.—Malleable Founding

Chairman, John Wagner, Wagner Malleable Iron Co., Decatur, Ill. Co-chairman, R. J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich.
Malleable Iron in the Defense Program, by J. H. Lansing, Malleable Founders' Society, Cleveland.
Observations on the Duplexing of Malleable Iron, by G. A. Schumacher, Albion Malleable Iron Co., Albion, Mich.

10:30 a.m.—Gray Iron Founding

Chairman, W. H. Spencer, Thomas Foundries, Inc., Birmingham, Ala. Co-chairman, H. P. Kreulin, Spring City Foundry, Waukesha, Wis.
Gating and Risering for High Pressure Work, by H. H. Judson, Goulds Pumps, Inc., Seneca Falls, N. Y.
Effects of Moisture and Preheating of Cupola Blast on Gray Cast Iron, by J. T. Eash and R. E. Smith, International Nickel Co., Bayonne, N. J.
Melting in the Cupola—A Summary of Certain Papers on Combustion Theories, by S. C. Massari and R. W. Lindsay, Association of Manufacturers of Chilled Car Wheels, Chicago.

10:30 a.m.—Apprentice Training

Chairman, James G. Goldie, Cleveland Trade School, Cleveland. Co-chairman, Franklin Farrel, 3rd, Farrel-Birmingham Co., Ansonia, Conn.
Apprentice Training in the Defense Program, by W. F. Patterson, chief of apprenticeship, Division of Labor Standards, Washington.
Related Instruction for the Foundry and Pattern Shop Apprentice—A Symposium:
(a) *What May Be Taught the Foundry Apprentice as Related Foundry Instruction,* by A. L. Armantrout, Carnegie-Illinois Steel Corp., Chicago.
(b) *What May Be Taught the Foundry Apprentice as Related Pattern Instruction,* by K. F. Ode, The Falk Corp., Milwaukee.
(c) *What May Be Taught the Pattern Apprentice as Related Pattern Instruction,* by Frank C. Cech, Cleveland Trade School, Cleveland.
(d) *What May Be Taught the Pattern Apprentice as Related Foundry Instruction,* by George Gedeon, Aluminum Co. of America, Cleveland.
Jobs in the Foundry, by A.F.A. Committee, chairman, A. H. Wornom, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

12:30 p.m.—Malleable Division Round Table Luncheon

Chairman, D. P. Forbes, Gunite Foundries Corp., Rockford, Ill.
Discussion leader, J. H. Lansing, Malleable Founders' Society, Cleveland.

12:30 p.m.—Nonferrous Division Round Table Luncheon

Chairman, C. V. Nass, Fairbanks Morse & Co., Beloit, Wis.
Causes of Porosity and Leakage in Nonferrous Castings, by A. H. Hesse, Naval Research Laboratory, Anacostia Station, Washington.

2:00 p.m.—Job Evaluation and Time Study

Chairman, F. E. Wartgow, American Steel Foundries, East Chicago, Ind. Co-chairmen, J. A. Westover, Clark Equipment Co., Buchanan, Mich. and W. E. George, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.
Job and Employe Rating, by A. L. Kress, National Metal Trades Association, Chicago.
Practical Time Study Measurements for Foundry Operation, by Phil Carroll, Jr., New York.

2:00 p.m.—Sand Research—Steel Foundry Sands

Chairman, J. B. Caine, Sawbrook Steel Castings Co., Lockland, O. Co-chairman, D. L. Parker, General Electric Co., Everett, Mass.
Progress Report on Investigation of High Temperature Properties of Steel Sands, by J. R. Young, Cornell University, Ithaca, N. Y.
Some Properties of Foundry Sands at High Temperatures, by G. W. Ehrhart, Cornell University, Ithaca, N. Y.
Synthetically Bonded Steel Molding Sands, by R. E. Morey and H. F. Taylor, Naval Research Laboratory, Anacostia Station, Washington.
Report of Committee on Foundry Sand Research.

3:30 p.m.—Annual Gray Iron Foundry Shop Course—Session 2

Chairman, R. F. Hine, Studebaker Corp., South Bend, Ind.
Discussion Leader, E. J. Carmody, Chas. C. Kawin Co., Chicago.
Subject—*Gating and Risering.*

4:30 p.m.—Annual Lecture Course—Session 2

Chairman, H. Bornstein, Deere & Co., Moline, Ill.
Core Practices and Theories.
Lecturer, H. W. Dietert, Harry W. Dietert Co., Detroit.

7:00 p.m.—Apprentice Supervisors' Dinner

Presiding, James G. Goldie, Cleveland Trade School, Cleveland.

8:00 p.m.—Use of Scrap in Cupola Melting

An informal discussion on Use of Scrap Iron in the Cupola, sponsored by Cupola Research Committee.

TENTATIVE PROGRAM AT NEW YORK

Wednesday, May 14

9:30 a.m.—Annual Sand Control Shop Course—Session 3

Chairman, E. E. Woodliff, Harry W. Dietert Co., Detroit.
Discussion Leader, C. W. Thompson, New Jersey Silica Sand Co., Millville, N. J.
Subject—*Gray Iron Shop Control.*

10:30 a.m.—Annual Business Meeting and Awards Presentation

Presiding, President L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala.
President's Annual Address.
Reports of Officers.
Presentation of Awards.
Awards Address, by S. Wells Utley, Detroit Steel Castings Co., Detroit, and past president, A.F.A.

1:00 p.m.—Steel Division Luncheon

Presiding, R. S. Munson, Atlantic Steel Castings Co., Chester, Pa.

2:00 p.m.—Sand Research

Chairman, W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J. Co-chairman, R. F. Harrington, Hunt-Spiller Mfg. Co., Boston.
Dry Sand Molding Procedure for Heavy Castings, by W. A. Hambley and A. Lebesh, Allis-Chalmers Mfg. Co., Milwaukee.
Testing Foundry Sands and Its Co-ordination with Molding Results, by J. J. Boland, Griffin Wheel Co., Chicago.
Clay Slurry Additions for Molding Sand Rebonding, by R. H. Mooney, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich.
Reproducibility of Tests of Foundry Sands, by Stanton Walker, National Industrial Sand Association, Washington.

2:00 p.m.—Patternmaking

Chairman, Vaughan Reid, City Pattern Works, Detroit. Co-chairman, Frank C. Cech, Cleveland Trade School, Cleveland.
Co-operation Between the Pattern Shop, the Engineer and the Foundry, by E. J. Brady, Western Foundry Co., Chicago.
Use of Tin Forms in Molding Practice, by W. A. Smith, Smith-Richardson Mfg. Co., Geneva, Ill.

2:00 p.m.—Foreman Training

Chairman, W. E. George, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. Co-chairman, A. C. Ziebell, Universal Foundry Co., Oshkosh, Wis.
Foreman Training for the Defense Program, by Glenn Gardiner, Forstman Woolen Co., Passaic, N. J., and Elliott Service Co., New York.

2:30 p.m.—Steel Founding

Chairman, R. S. Munson, Atlantic Steel Castings Co., Chester, Pa.
Converter Developments, by A. W. Gregg, Whiting Corp., Harvey, Ill.
Use of Models in Improving Steel Casting Practice, by S. W. Brinson, Norfolk Navy Yard, Portsmouth, Va.
Report of Committee on Heat Treatment of Steel Castings.

3:30 p.m.—Annual Gray Iron Foundry Shop Course—Session 3

Chairman, Kenneth H. Priestley, Eaton-Erb Foundry Div., Eaton Mfg. Co., Vassar, Mich.
Discussion Leader, A. E. Rhoads, Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.
Subject—*Electric Furnace Melting in the Gray Iron Foundry.*

4:30 p.m.—Annual Lecture Course—Session 3

Chairman, Fred J. Walls, International Nickel Co., Detroit.
Core Practices and Theories.
Lecturer, H. W. Dietert, Harry W. Dietert Co., Detroit.

7:00 p.m.—Annual A.F.A. Dinner

Address by Dr. Allen A. Stockdale, National Association of Manufacturers, New York.

Thursday, May 15

9:30 a.m.—Annual Sand Control Shop Course—Session 4

Chairman, D. L. Parker, General Electric Co., Everett, Mass.
Discussion Leader, W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J.
Subject—*Steel Sand Shop Practice.*

9:30 a.m.—Annual Gray Iron Foundry Shop Course—Session 4

Chairman, W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee.
Discussion to be led by members of gray iron division committee on analysis of casting defects.
Subject—*Causes of Casting Defects and Remedies.*

10:30 a.m.—Gray Iron

Chairman, J. W. Bolton, Lunkenheimer Co., Cincinnati. Co-chairman, R. G. McElwee, Vanadium Co. of America, Detroit.
Effects of Pouring Temperatures on Mechanical Properties of Cast Iron, by V. A. Crosby, Climax Molybdenum Co., Detroit.
Some Factors Influencing Graphitizing Behavior of Cast Iron, by S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago.
Effect of Ladle Inoculation on the Solidification of Cast Iron, by J. T. Eash, International Nickel Co., Bayonne, N. J.
Notes on the Undercooling of Gray Cast Iron, by Alfred Boyles, Battelle Memorial Institute, Columbus.

10:30 a.m.—Plant and Plant Equipment

Chairman, W. R. Jennings, John Deere Tractor Works, Waterloo, Iowa. Co-chairman, James Thomson, Continental Roll & Steel Foundry Co., East Chicago, Ind.
Sand Preparation by the Wet Method, by Howard Mason, Symington-Gould Corp., Depew, N. Y.
Centrifugal Casting and Equipment, by N. Janco, Centrifugal Casting Machine Co., Tulsa, Okla.
Cupola Dry Blast Equipment and Process, by F. M. Johnson, Surface Combustion Corp., Toledo, O.

10:30 a.m.—Steel Founding

Chairman, John Howe Hall, Philadelphia. Co-chairman, H. D. Phillips, Lebanon Steel Foundry Co., Lebanon, Pa.
Mechanism of Pin-Hole Formation, by C. E. Sims and C. A. Zapffe, Battelle Memorial Institute, Columbus, O.
Report of Committee on Radiography, by C. W. Briggs, Steel Founders' Society, Cleveland.

2:00 p.m.—Gray Cast Iron

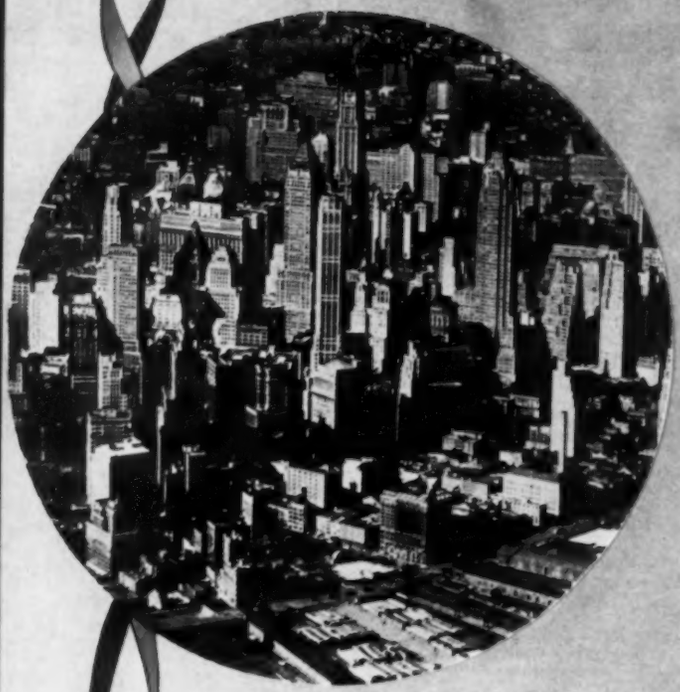
Chairman, V. A. Crosby, Climax Molybdenum Co., Detroit. Co-chairman, H. A. Deane, American Brake Shoe & Foundry Co., Mahwah, N. J.
Development and Control of Engineering Gray Cast Iron, by R. A. Flinn, American Brake Shoe & Foundry Co., Mahwah, N. J., and D. J. Reese, International Nickel Co., New York.
Heat Treatment of Cast Iron, by C. A. Nagler and R. L. Dowdell, University of Minnesota, Minneapolis.

2:00 p.m.—Steel Founding

Chairman, F. A. Melmoth, Detroit Steel Casting Co., Detroit. Co-chairman, D. C. Zuege, Sivyer Steel Casting Co., Milwaukee.
The Fluidity of Carbon and Alloy Cast Steels, by H. F. Taylor and E. A. Rominski, Naval Research Laboratory, Anacostia Station, Washington and C. W. Briggs, Steel Founders' Society, Cleveland.
Report of Committee on Methods of Producing Steel for Castings.

4:00 p.m.—Annual Lecture Course—Session 4

Chairman, L. E. Everett, Kaukauna Machine Corp., Kaukauna, Wis.
Core Practices and Theories.
Lecturer, H. W. Dietert, Harry W. Dietert Co., Detroit.



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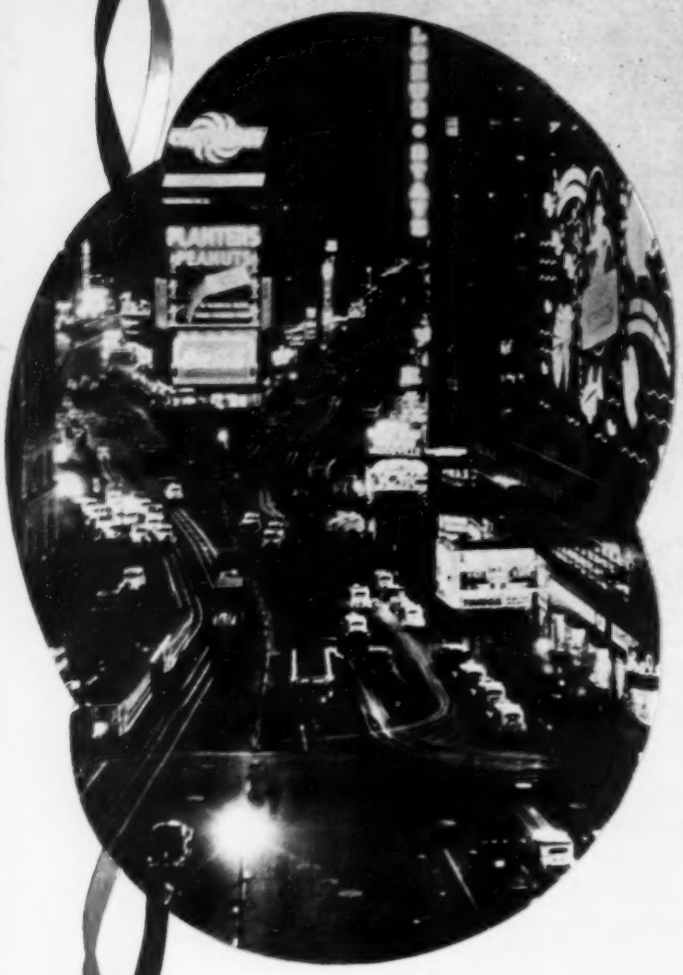

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A·F·A awards four gold medals for CONTRIBUTIONS to Foundry Progress

Donald J. Reese

IN RECOGNITION of distinguished service to the entire foundry industry, the American Foundrymen's Association will award four gold medals and one life membership during the forty-fifth annual convention in New York. Presentation of medals will take place at the annual business meeting to be held in Hotel Pennsylvania, Wednesday morning, May 14. Recipients and awards are as follows:

Charles Edgar Hoyt, executive vice president and manager of exhibits of the A.F.A., the Joseph S. Seaman medal, for his exceptionally outstanding service to the foundry industry as manager of foundry exhibits since 1908, as secretary and treasurer of the association from 1918 through 1936, and as executive vice president since 1936.

Donald J. Reese, engineer, Research & Development division, International Nickel Co. Inc., New York, the J. H. Whiting medal for his outstanding contributions to the foundry industry and the A.F.A. through his work in improvement of cupola melting methods.

Max Kuniansky, general manager, Lynchburg Foundry Co., Lynchburg, Va., the W. H. McFadden medal, for outstanding contributions to the gray iron industry and to the association.

Fred L. Wolf, technical director, Ohio Brass Co., Mansfield, O., the John A. Penton medal, for his outstanding contributions to the nonferrous and malleable castings industry and the association.

In addition to the medal awards, the A.F.A.

Henry M. Lane

Max Kuniansky

Fred J. Wolf

Charles Edgar Hoyt

will recognize the long continued service and early pioneering work in the technical development of the industry carried on by Henry M. Lane, Grosse Isle, Mich., by making him an honorary life member of the association.

The four medal awards were established by the association in 1920 through funds donated by four past officers of the association whose names are connected with the medals. Medals are awarded on the recommendation of a board of awards comprised of the last seven living past presidents. Present members of the awards board are:

Henry S. Washburn, Plainville Casting Co., Plainville, Conn., chairman; Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; Hyman Bornstein, Deere & Co., Moline, Ill.; James L. Wick Jr., Falcon Bronze Co., Youngstown, O.; D. M. Avey, Tulsa, Okla.; Frank J. Lanahan, Fort Pitt Malleable Iron Co., Pittsburgh, and T. S. Hammond, Whiting Corp., Harvey, Ill.

Charles Edgar Hoyt, executive vice president, treasurer and manager of exhibits of the association was born in Wayland, Mich. and is member of a family of foundrymen. His father and three uncles learned the molders' trade in the days when a seven-year apprenticeship was required. During vacations he worked in the foundry. After finishing school he was associated with his father for a time in operating a jobbing foundry and machine shop.

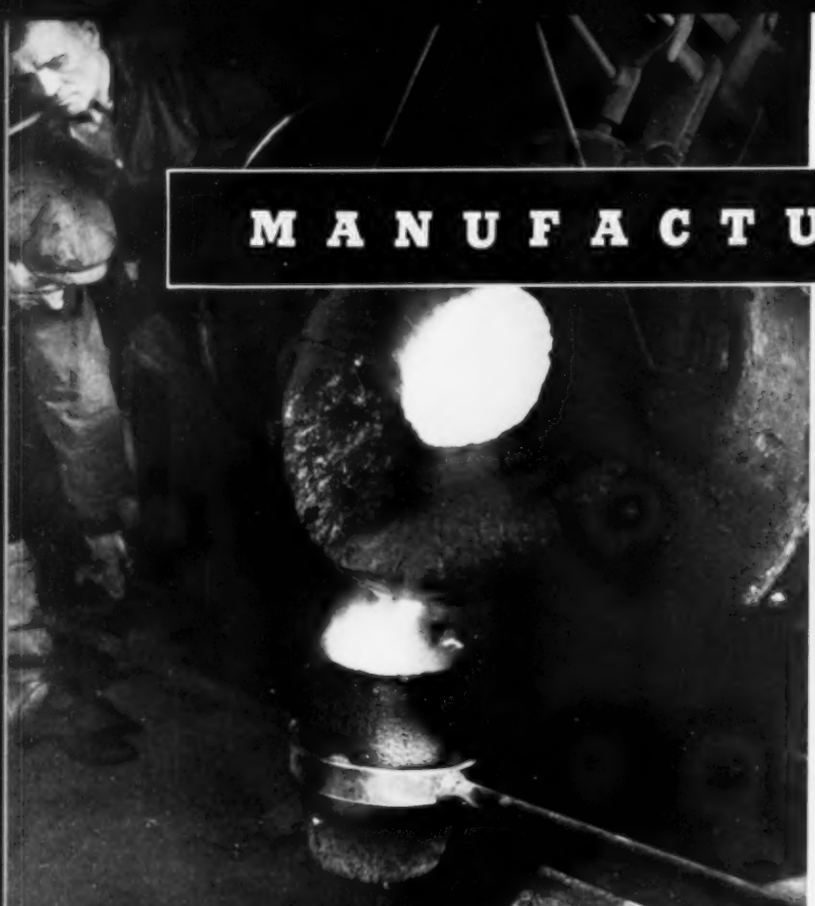
He then accepted a position with Michigan State College, Lansing, Mich., in charge of pattern shop and foundry work. After three and a half years he resigned to accept a position on the engineering faculty of Lewis Institute, Chicago, where he took an active part in foundry association work.

In 1907 and again in 1908 as secretary-treasurer of the Chicago Foundry Foremen's Association (later the Chicago Foundrymen's Club), he staged two day conventions and exhibits at Lewis Institute which attracted the attention of the national association. This resulted in his election as secretary-treasurer of the Associated Foundry Foremen of American at the A.F.A. convention in Toronto in 1908 and, the following year, secretary of the Foundry Supply Association. Mr. Hoyt continued as secretary and manager of the exhibits of this association, and its successor the Foundry & Machine Exhibition Co., until 1916 when the exhibits were taken over by A.F.A. and he was made manager of exhibits.

When the association was incorporated in 1916, Mr. Hoyt was one of the signers of the application for a charter and was elected a director. When the association established a war service office in Washington in response to a government request, Mr. Hoyt resigned from the faculty of Lewis Institute, and was placed in charge

At the 1918 convention he was elected secretary-treasurer of A.F.A., to succeed A. O. Backert, who resigned to accept the presidency. In 1926, Mr. Hoyt was made executive secretary, treasurer and manager of exhibits. Since 1936 he has been executive vice president.

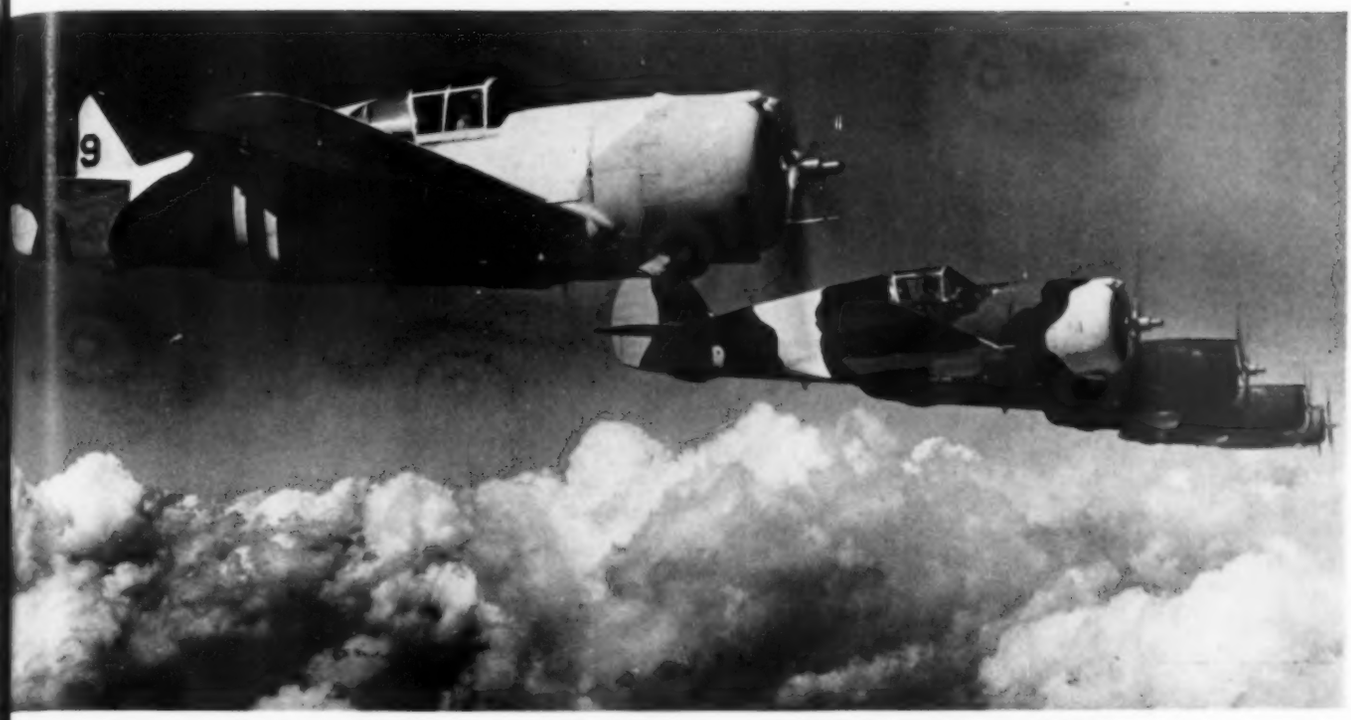
Mr. Hoyt has served on numerous local and national committees of civic and association character. He is a member of and active on committees of the Union (*Please turn to page* 170)



MANUFACTURING

Nonferrous Sand Castings

FOR



AIRCRAFT

By Robert E. Ward

Metallurgical Engineer
Eclipse Aviation Division
Bendix Aviation Corp., Bendix, N. J.

ONE of the pioneers in the development of aluminum and magnesium sand castings for aircraft use is the Eclipse Aviation Foundry, with its main plant at Bendix, N. J., and subsidiary plant at Little Falls, N. J. The main plant, a one story building occupying 36,000 square feet of floor space and employing over 300 men, is completely equipped to manufacture castings of aluminum and magnesium, as well as the brass and bronze alloys.

Development of the foundry was brought about by the Eclipse Aviation division of the Bendix Aviation Corp. expressly to provide a controlled source of aircraft quality nonferrous castings to be used in the manufacture of Eclipse aircraft accessories. However, at present the foundry is not only supplying castings to divisions of the Bendix Aviation Corp., but also to other manufacturers of all classifications.

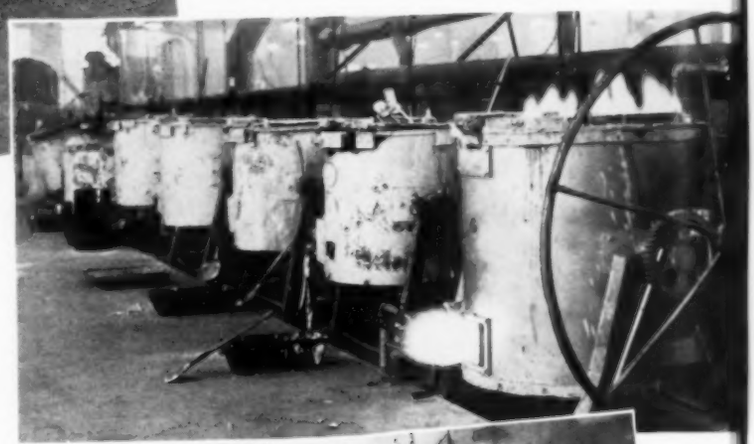
The foundry building includes separate departments for pattern making and storage; sand and raw material storage; core making and baking; molding; melting; cleaning and surface treating; inspection and shipping; and an enclosed office space. The plant is laid out for in-line production with the core, pattern and raw material storage at one end and the inspection and shipping departments at the opposite end. At no point during the manufacture of castings do any two operations interfere.

It is impractical to introduce a completely mechanized or conveyor system of manufacture since maximum flexibility of operation is necessary to meet the frequent demand for comparatively small lots of castings of different alloys. However, the core shop, is equipped with a continuous baking oven and a conveyor system which carries the cores from the benches, through the oven to the finishers and finally to the storage department.

In manufacturing sand castings from different alloys, of which about ten aluminum alloys, eleven copper alloys, and one magnesium alloy are used most commonly in the aircraft industry, the problem of proper identification and separation of the sand, metal and castings is very great. To facilitate classification, the foundry is divided into three sections for melting and casting of

Fig. 1 (Upper left)—Transferring molten bronze from the melting furnace to the pouring ladle. Fig. 2 (Left center)—Modern type construction of foundry building. Fig. 3 (Left)—Molds and molders in the magnesium foundry. Melting furnaces are to left of the illustration. Fig. 4 (Right above)—Formation flight of airplanes. Official photograph U. S. Army Air Corps

Fig. 5 (Left)—One hundred and sixty-five magnesium alloy aircraft engine nose pieces ready for shipment. Fig. 6 (Below)—A battery of oil-fired, pot-type furnaces for melting aluminum. Fig. 7 (Next below)—Combined tumbling and shotblast equipment for cleaning. Fig. 8 (Bottom)—Basket-type conveyor transports cores from core makers' benches through the oven to the finishers. Fig. 9 (Bottom left)—Pouring aluminum castings



aluminum, magnesium and copper base alloys, and those departments further are subdivided for making different alloys of those base metals.

Molding sands which are stored in the temperature-controlled plant, are kept in separate

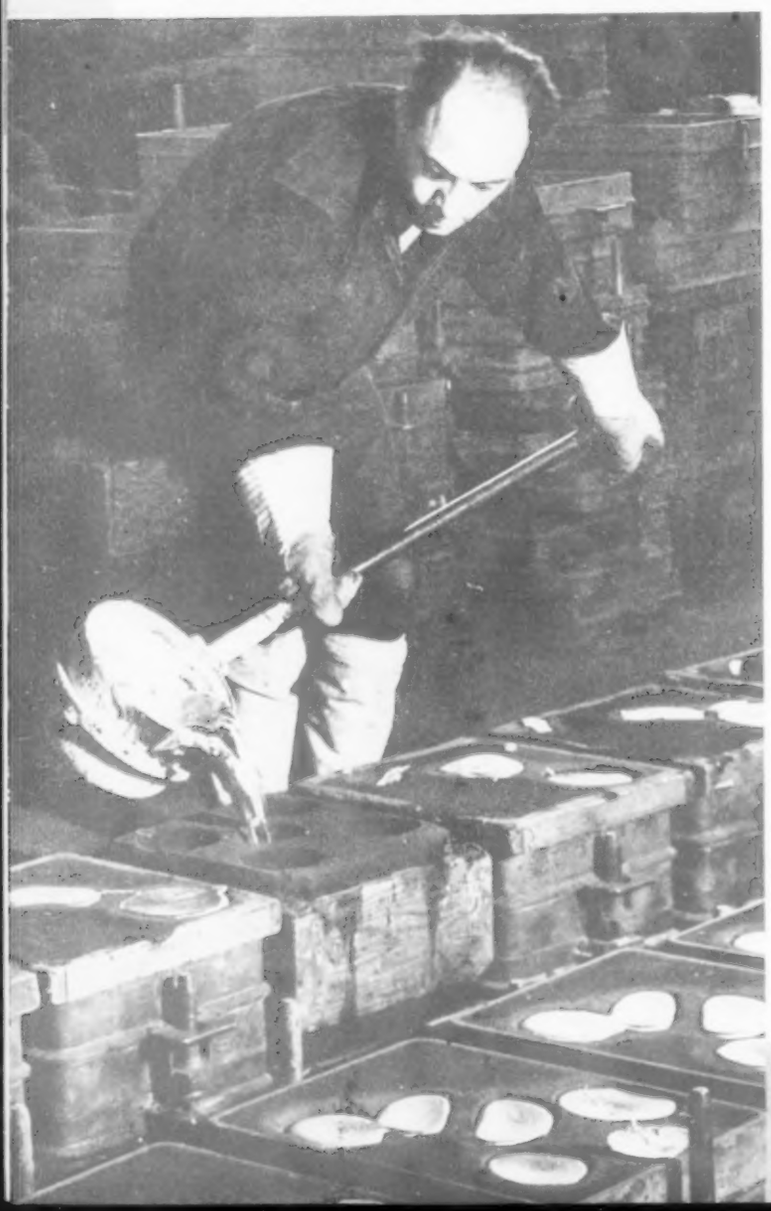


Fig. 10 (Above)—Heat treating department showing in background two solution treating furnaces, quenching tank with vapor arising, and cages containing castings which are ready for heat treatment. Fig. 11 (Right)—Trimming sand core for magnesium generator housing casting

hollow-tile bins. They are transported to the molding benches by hand trucks where they are mixed to suit the requirements for magnesium, aluminum or copper alloy castings. Portable conditioning equipment is used in each molding department to eliminate the possibility of heaps of different sands becoming mixed. Each heap is given frequent routine tests for moisture content, permeability, strength, etc. The installation of complete sand testing equipment has made possible the casting of more intricate designs in addition to improving surface finish and reducing the number of scrapped castings. These tests are made in a separate sand-control laboratory.

Since the foundry is divided into sections for melting the different alloys, it has also been found advisable to divide the molding department so that the molders are near the melting furnaces. Molds are hand or machine rammed, depending on size, and placed on the floor between the molder and the furnace, where they are poured. The castings are shaken out of the molds and the used sand is piled separately on the floor near the molder where it remains until reconditioned and returned to the original pile alongside the molder.

To meet manufacturing specifications, it is necessary that the alloys be made of virgin (primary) metals. It has been found practical, except for one or two of the most commonly used alloys, to alloy the metal at the foundry. The raw materials are stored near the end of the foundry building, each shipment of material being identified with a lot number corresponding to its analysis as determined by the chemical laboratory. In making up a melt, the metal is weighed out at the storage room and the correct amount of each constituent is transported to the furnace. All melts are made in 300 to 1000-pound charges.

Only one alloy of magnesium (6 per cent aluminum, 3 per cent zinc, remainder magnesium) is cast in the foundry and this material is purchased in large quantities, already alloyed in pigs. It is then remelted in oil-fired pit furnaces of 300 pounds capacity and fluxed with sodium chloride which acts as a cover over the molten metal. The metal is dipped from the furnaces with hand ladles equipped with bottom pouring spouts. A sufficient number of furnaces have been installed so that by staggering the pouring time of the melts it has been possible to establish a more or less continuous casting procedure.

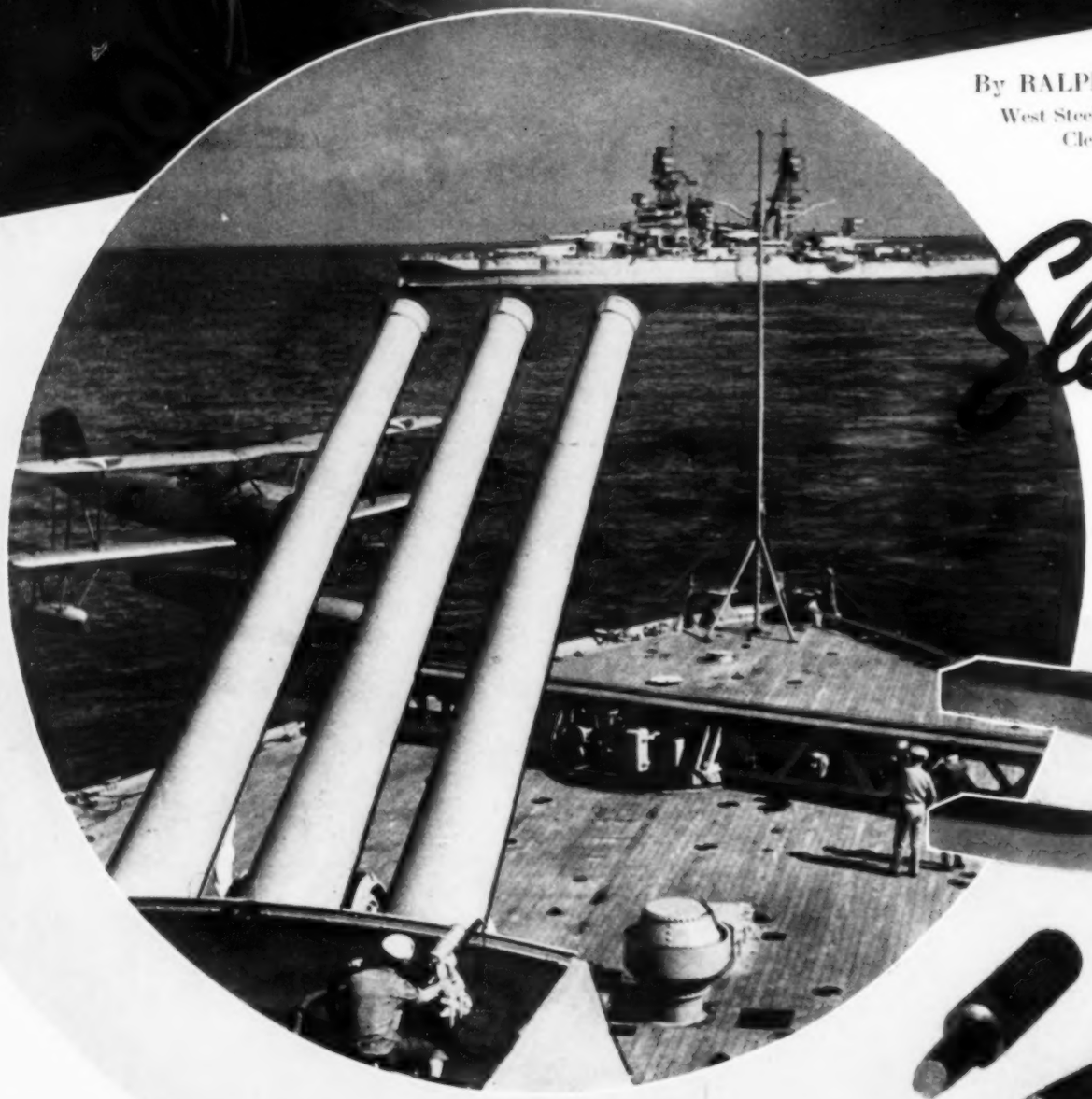
In some cases, where several exceptionally large castings are to be poured, two or more furnaces are brought up to temperature at one time. To prevent burning of the magnesium during melting and pouring, that section of the foundry is ventilated in such a manner so as to prevent drafts from passing over the furnaces or the molds.

Two or three of the more commonly used aluminum alloys are also purchased already alloyed in large quan- (*Please turn to page* 175)

By RALPH R. WEST
West Steel Casting Co.
Cleveland

Electric S

MEET I



ELECTRIC steel was produced at the West Steel Casting Co., Cleveland, as early as 1918 although in those early days of electric furnace processing the two-phase Snyder furnace was used mostly for melting and the heats were finished in the converter. That was done due to the bottom contact trouble during the refining period. It was nothing unusual during the years 1917 to 1921 to have heats in the furnace well over 6 or 7 hours.

Today two 1½-ton per hour standard 'Electromelt' furnaces are being operated. One has a 2,000 kilovolt-ampere transformer to supply power and the other uses a 1200 kilovolt-ampere transformer.

Four recognized processes are in use at present on acid practice for electric steel melting and are as follows: (1) The dead-melt; (2) The partial boil; (3) The full boil, and (4) The reduced silicon practice. Of course, there also are variations and combinations having in some cases single or double slags.

Practice at the West Steel Casting Co., at present is the third mentioned as far as the heats of this article are concerned carrying with that of course, the double slag. The present practice is to charge the furnace with approximately 1500 pounds of returned heads and gates from the foundry, 2000 pounds of the best grade SAE 1040 or 1050 forging scrap checking for sulphur and phosphorus content. Those must be as low as possible.

To this 3500 pounds approximately 1500 or 1600 pounds of SAE 1015 or 1020 punching scrap are added. As an alternate, in case of the carbon being low on the forging scrap either a little wash metal or pig iron is added with the charge.

As can be readily seen from Table I shop scrap and plate scrap and forging crops are listed separately on the charging sheet. Table I comprises a melting sheet for one day's operations The column at the left shows the heat number with lettering representing different types of steel manufactured regularly.

For example *R* stands for a regular run of steel with carbon approximately 0.20 to 0.30 per cent, manganese 0.60 to 0.80 per cent, phosphorus and sulphur under 0.05 per cent and silicon 0.30 to 0.45 per cent. Other elements present are usually in negligible quantities. We believe the heat sheet shown in Table I speaks for itself although it might be added that part of the sheet had to be omitted due to lack of space. However, that half carried the daily molding record as far as correlating flasks poured with heat numbers.

That portion of the sheet also carried dates, daily hours for that day, the month thus far and the total, in addition to the steel poured for that

ic Steel Castings

T DEFENSE REQUIREMENTS

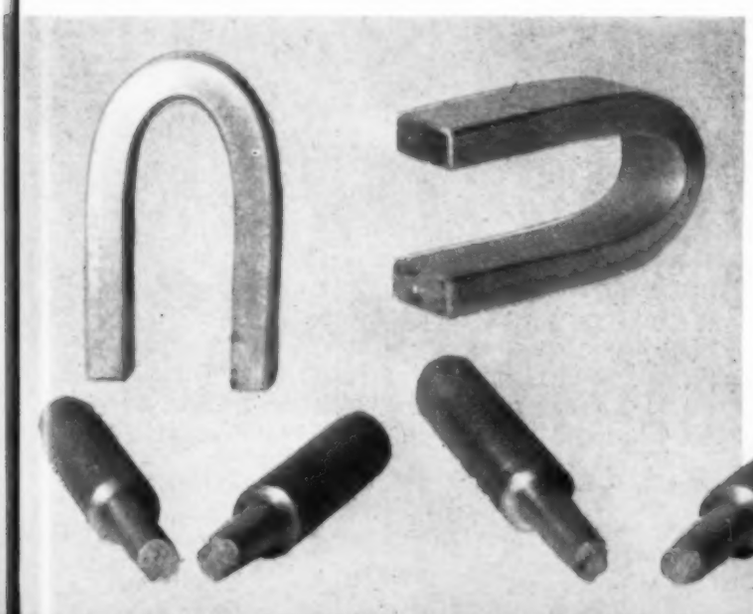


Fig. 1 (Upper left)—Pouring part of a heat of electric steel into the ladle. Fig. 2 (Lower left)—Aircraft taking off U. S. Navy vessels other than plane carriers are sent off by catapult. Only a short runway is required. NEA photo. Fig. 3 (Left)—Different views of tensile test and bend test specimens

Table I

Electric Furnace Daily Heat Record

ctric Furnace No. 2

Grade	Melting Time: Start AM	Melting Time: Finish	Charging Time Min.	Melted Down	On Low Min.	On High Min.	Kw's on low	K W Hours	Hours	Demand Reading	Shop	Forging	Punchings	Steel Poured	Scrap Charged: Fer Mn	Alloy Additions: Sil Mn	Spieg	Zir	Mo	Va	Iron Ore	Al	Final Analysis: C	Mn	Si	Sul	Phos	Cr	Ni	Van
R	11:28	12:18	:50		11:52	24	26	900	1260	12	191	1500	1400	1300	4200	49			36					.238	.67						
R	12:31	1:24	:53	13	12:58	27	26	720	1140	1	185	1500	1500	1300	4200	49			36					.300	.76						
Navy	1:36	2:22	:46	12	1:54	18	28	730	1110	2	213	1700	1400	1100	4200	49			36					.225	.64	.51	.015	.022			
R	2:35	3:24	:49	13	2:55	20	29	750	1210	3	212	2200	1500	1300	5000	59			42					.296	.73						
Navy C	3:35	4:25	:50	11	3:55	20	30	750	1210	4	212	2100	1600	1300	5000	59			42					.271	.63	.33	.025	.022			
30-40	4:40	5:36	:56	15	4:57	17	39	750	1230	5	205	2400	1300	1300	5000	59			42					.384	.69						
Navy	5:43	6:37	:54	7	6:06	23	31	750	1270	6	158	2200	1700	1300	5200	61			45					.38	.61	.33	.017	.023			
L.C.	7:04	7:46	:42	27	7:24	20	22	750	1100	7	126	2400	1300	1300	5000	59			42					.228	.68						
Die Block	8:05	8:45	:40	19	8:24	19	21	750	1050	8	184	2000	1200	1300	4500	52			38					.460	.80						.08
L.C.	9:25	10:22	:57	40	9:50	25	32	750	1300	9	174	2300	1400	1300	5000		75		28					.180	.54						
R	10:50	11:39	:49	28	11:14	24	25	750	1200	10	163	2200	1500	1300	5000	59			42					.282	.66						
L.C.	12:15	1:00	:45	36	12:39	24	21	750	1100	11	104	2200	1500	1300	5000		75		28					.278	.69						
R	1:33	2:14	:41	33	1:52	19	22	750	1100	12	144	2000	1500	1500	4000	47			34					.180	.52						
Total	Power on to off	14:46	10:32	4:14					15280						61300	602	150		491	19	12	2600	65								

ctrodes

		High
Avg. Kw. Per Heat	1175	
Avg. Kw Per Ton	500	213

Metal Cast—Net	60,300
Metal Pigged	400
Metal Run-outs	600

Meter Reading	6319	
Meter Reading	6265	
Consumption	54	21,600

Fig. 4 (Above)—Pouring molds on the floor. Fig. 5 (Right)—Partial view of machine molding showing conveyor system for molds. Fig. 6 (Upper right)—Sketch showing dimensions of test bar

day, and month thus far and its total. From that we carry what we term "the daily factor" and "factor so far this month."

Table I does not represent the best operation but neither does it give the worst conditions. It has been a help however in correlating office molding records with heat records and double checking the same.

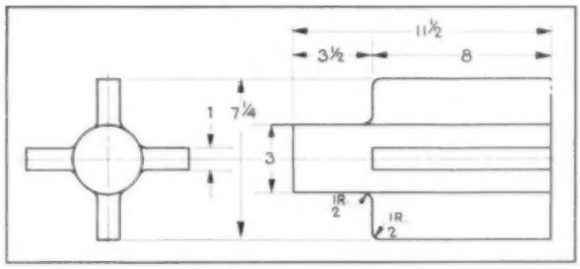
While a technical discussion of the method of melting is not in order here, a brief description follows: The heat is melted after 25 to 30 minutes and iron ore is added until the right content of ore with the proper amount of heat present is reached to start the *boil*. During this period the fumes from the furnace should remain brown since fumes of a lighter character indicating reduction of silicon would mean insufficient ore has been added.

After the boil, or during the last phases of that reaction, the slag in the furnace is tapped off, and a new slag of used sand with a small amount of crushed coke is added. At that point an early amount of manganese, either in the form of spiegeleisen or ferromanganese is added. That early addition of manganese takes care of any excess oxide and acts as an early *cleanser*. After rabbling the slag thoroughly and the proper tem-

perature is reached, zirconium, ferrosilicon and ferromanganese are introduced.

Before tapping and after the desired temperature has been reached which in this particular case for government work is about 3150 to 3175 degrees Fahr., a small amount of molybdenum is added. In a heat of approximately 5000 pounds that would mean about 4 pounds of molybdenum. A small amount of shot aluminum is added to the ladle into which the heat is being tapped just before the metal hits the bottom. That amount of aluminum is generally about half as much as used in regular commercial castings.

All work at West Steel Casting Co. is bottom poured with nozzle openings averaging from 1¼ to 2 inches inclusive. As many as 110 to 120 molds from one of the snap heats have been



poured and in some cases where the heads were stopped off to benefit the yield two openings to a mold have been used.

Table I will give some idea of the operation of one of the furnaces and it may be noted that a heat is tapped approximately every hour. Test bars are cast attached (*Please turn to page* 177)

Table II

Chemical Composition and Physical Properties of Heats

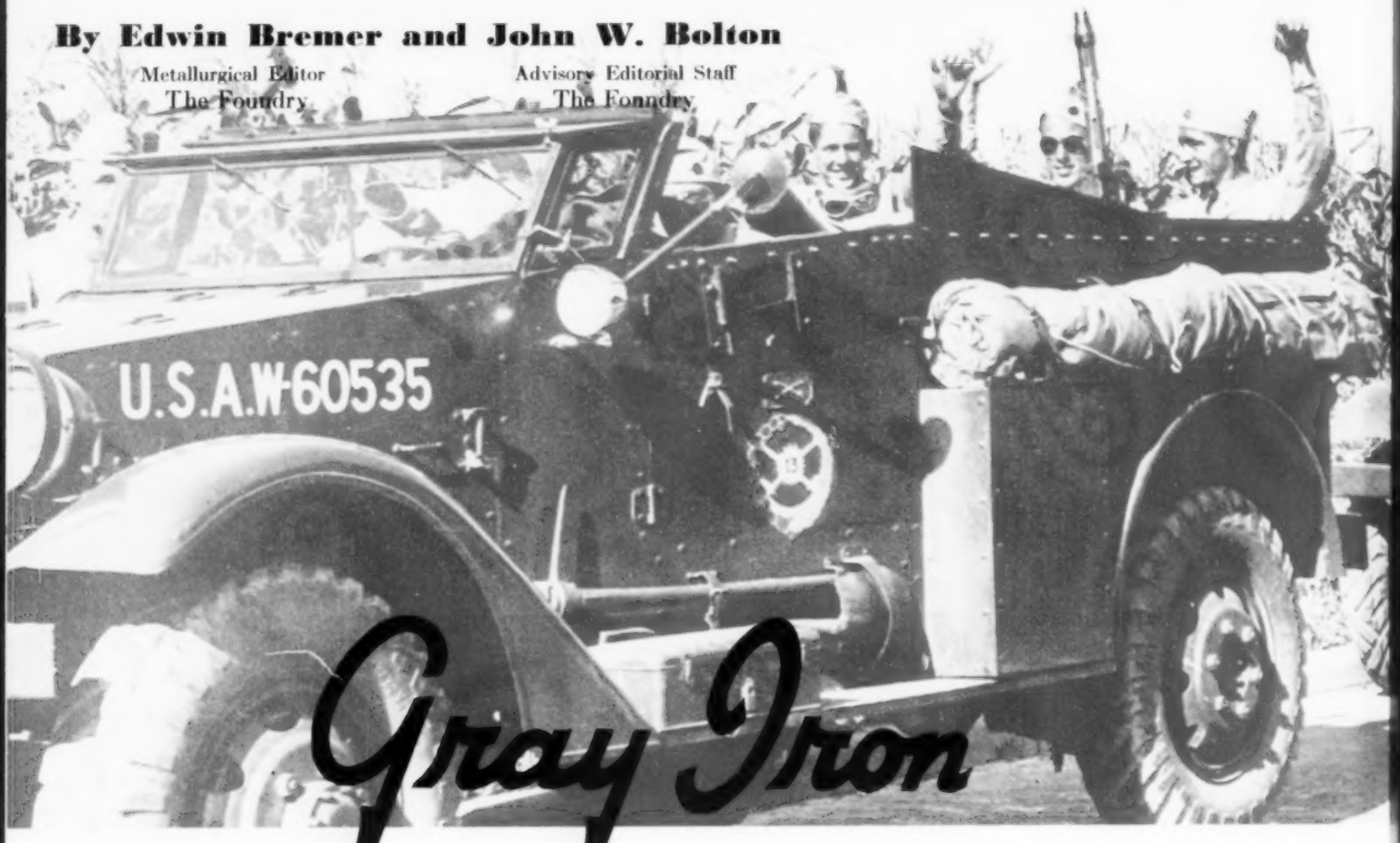
No.	C %	Mn %	Si %	S %	P %
1	0.300	0.66	0.287	0.047	0.039
2	0.264	0.54	0.275	0.017	0.020
3	0.310	0.57	0.310	0.034	0.032
4	0.293	0.58	0.378	0.031	0.025
5	0.268	0.55	0.388	0.025	0.033
6	0.277	0.58	0.343	0.031	0.038
7	0.270	0.49	0.296	0.019	0.035
8	0.261	0.37	0.204	0.026	0.028
9	0.304	0.49	0.289	0.018	0.032
10	0.290	0.48	0.270	0.033	0.031
11	0.280	0.50	0.301	0.038	0.032
12	0.262	0.46	0.275	0.035	0.034
13	0.277	0.72	0.435	0.040	0.029
14	0.327	0.72	0.362	0.036	0.037
15	0.263	0.53	0.376	0.029	0.029
Chemical Composition (maximum) for Class D—49Sl).					
	0.35	0.70	0.50	0.06	0.05

No.	Yield Pt. p.s.i.	Tens. Str. p.s.i.	Elong. in 2 in. %	Red. of Area %
A	49,500	79,670	25	34.06
B	40,800	73,140	27	41.49
C	42,000	70,780	27	34.07
D	45,560	78,870	26	38.21
C	43,400	72,800	25	35.00
D	42,360	71,480	29	36.11
E	43,750	72,500	28	43.00
F	40,430	70,130	31	44.93
G	41,250	71,950	27	35.90
H	43,010	72,270	24	33.12
I	43,600	73,550	26	37.20
J	44,100	71,430	26	36.00
K	43,900	71,250	25	37.80
L	40,500	74,350	25	32.20
M	46,100	75,270	26	38.80
Physical Properties (minimum) for Class D—49Sl).				
	40,000	70,000	24	30.00

By Edwin Bremer and John W. Bolton

Metallurgical Editor
The Foundry

Advisory Editorial Staff
The Foundry



Gray Iron

CAN SERVE EFFECTIVELY

TODAY war is a highly mechanized affair but notwithstanding the courage of direct combatants, and the tactical skill of field commanders, it remains a fact that success or failure is tied up intimately with the degree of leadership in invention and production.

What can and what should the foundryman, and particularly the gray iron foundryman, do to serve most effectively? Produce castings—good castings—to the limits of his ability? Yes, surely—but it goes further than that. "Business as usual" must be scrapped. To win it is necessary to become iconoclasts, sweeping aside old prejudices and preferences, and striving for sound, efficient, rapid progress.

Without question, intelligent selection and utilization of materials of construction is an important factor both in development of new and improved mechanisms and in extending production itself. That is self evident but it may be pertinent to ask what is the best material? Jeffries and Archer state: "The proper material to select for any given purpose is that which will perform the required service at the lowest ultimate cost." To that may be added today the question of availability in quantity.

Foundrymen, through the agency of the A. F. A., the A. S. T. M., the A. S. M. and other bodies, through business publications, and to some degree as individuals and commercial groups, in a large measure have made available to the designer, engineer and consumer information on improvements in their product and on sound extension of its application. Praiseworthy as this effort has been, it has fallen short of full effectiveness—particularly in gray iron. Say what we may and cite the known striking exceptions, it neverthless remains a fact that cast iron is not regarded as a very worthy engineering material by many of the consuming public.

Many will dispute that statement, and will point to numerous cases where cast iron has regained lost markets and even gained acceptance on some new applications. However, their attention is directed to the prescriptions, the limitations and the specifications of a number of large consuming groups (including the government) insofar as those deal with cast iron and its applications. Also they are requested to consult some of the general reference books to which purchasing agents, some designers, and many students often refer.

For example Brady's *Materials Handbook* ("An Encyclopedia for Purchasing Agents, En-

NEA Photo

Y IN DEFENSE

gineers, Executives and Foremen") fourth edition, 1940, asserts:

> Cast iron is brittle and not malleable. Its advantages are that it is easy to give it any desirable form in the casting, and it is easy to machine, is cheap, and has a higher proportional fatigue strength than steel.
>
> When annealed at a temperature of about 800° Fahr. semisteel castings become soft, with considerable ductility, but lose 25 to 35 per cent of the tensile strength.
>
> High test cast iron. A term for cast iron that has been super-heated in the melting for pouring, poured in chilling molds, and then heat treated. All of the high cast irons are fine-grained and are not spongy like ordinary cast iron. They are marketed under many trade names.

In Woldman's *Engineering Alloys*, first edition, 1936, (serial no. 526, gray cast iron) the following appears:

> Tensile strength 22,500 pounds per square inch; 4 per cent elongation; uses, motor frames, fly wheels, valves, chilled rolls, crusher jaws; non-ductile, acid resisting iron.

In Kent's *Mechanical Engineers Handbook*, volume III, eleventh edition, 1938, is found:

> The engineering conception of gray cast iron generally is a brittle material incapable of shock or impact resistance. However, gray iron castings are (*Please turn to page* 165)

Top—Trucks of all types used in various Army units as in this mechanized cavalry unit use many gray iron castings. Above—Machine tools, important in defense production, are principally gray iron

Fig. 1 (Left)—Midget reconnaissance combat cars are used to scout out the enemy, rush up advance units and dart back for additional personnel and weapons. NEA photo. Fig. 2 (Below) — Group of castings which are employed in those cars

Malleable Iron

UTILIZED IN

Defense Program

By JAMES H. LANSING
Malleable Founders' Society
Cleveland

HENRY FORD recently said that the use of castings saves both time and tools. Never, in our time, has such a saving been of greater importance. In the present emergency we are called on to equip others at the same time that we are arming ourselves. And the nature of armament so has changed, with the advent of major scale mechanization, that the most effective use of machine tools and man hours has become of paramount importance in the defense program.

Fortunately, automotive manufacturers long have known that in malleable iron castings they have available a tough material which will withstand the shocks and strains of severe military service. It may be cast in practically any required section and the patterns may be designed so that minimum machining will be required. Furthermore, the required machine work may be performed with greater speed and ease than in the case of any material of comparable physical properties.

Realizing the saving in time and tools afforded by this tough material, automotive engineers, in collaboration with military engineers, have been quick to utilize malleable iron castings not only where they have given stout service in the past but also in additional applications necessitated by military requirements.

A case in point is the four-wheel drive armored scout car and the half-trac where a sturdy front driving axle assembly has been developed in which malleable iron is used in differential carriers and cases, in pinion cage, steering knuckles and hubs. A total of 315 pounds of malleable iron castings is used in the front axle of each four-wheel drive and half-trac armored scout car. In addition, on the four-wheel drive car, in such places as the rear axle assembly, the steering gear assembly, etc., 448 pounds additional of malleable are used, bringing the total per car to 763 pounds.

Information presented in this article will be elaborated greatly in a paper to be presented by the author at the malleable founding session to be held at the A.F.A. convention in New York, May 12 to 15

Also our fighting forces require a light, small and mobile vehicle which is available in the quarter-ton midget reconnaissance-combat car. It scouts out the enemy, rushes up advance units and darts back for additional personnel and weapons. These cars are designed to leave roads and strike across country, so must also have front as well as rear, driving wheels.

Fig. 1 shows a col- (*Please turn to page* 168)

Fig. 3 (Above) — Some of the malleable iron castings in army trucks. Fig. 4 (Right) — An army truck with 4-wheel drive in tough going

Gating

Nonferrous Castings

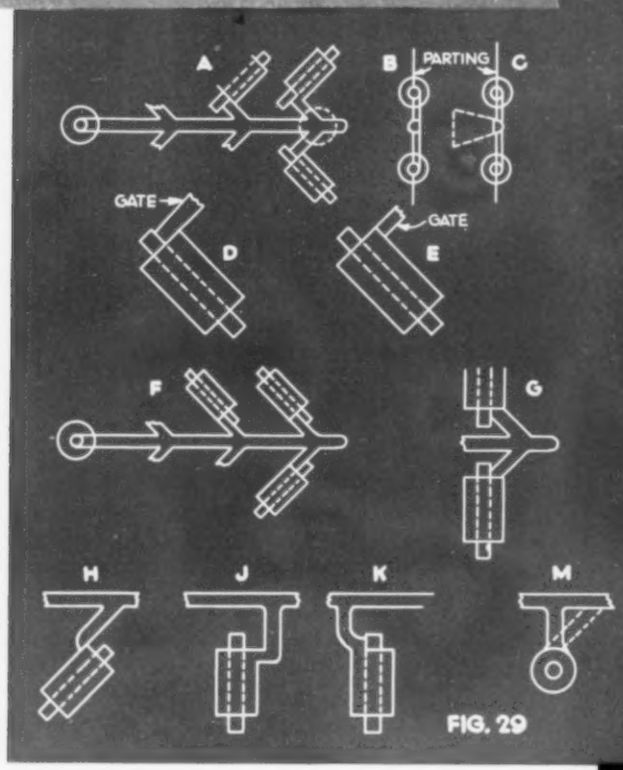


FIG. 29

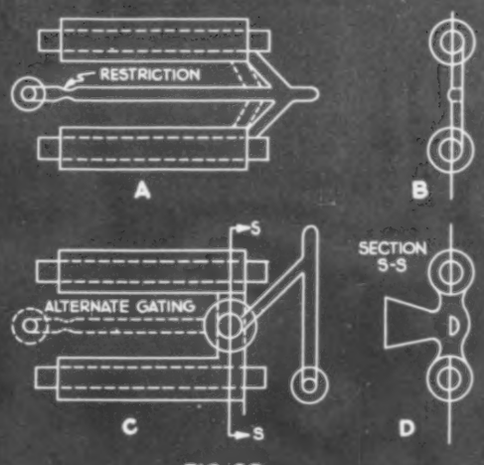


FIG. 30

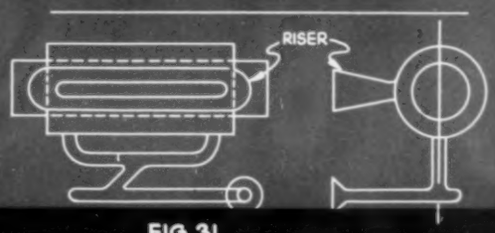


FIG. 31

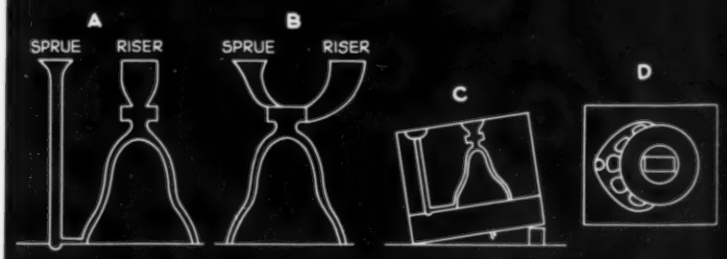


FIG. 32

Fig. 29—Sketches showing various methods of gating small bushings. Fig. 30—Two procedures for gating large bushings or similar castings. Fig. 31—With large bushing with thin walls the riser may extend the full length of the casting. Fig. 32—Bells may be gated in various ways. Fig. 33—Disks must be gated carefully to insure soundness. Fig. 34—Square or rectangular plates may be cast on edge or flat. Fig. 35—Flanged castings need careful study. Fig. 36—Box shape casting is difficult to cast.

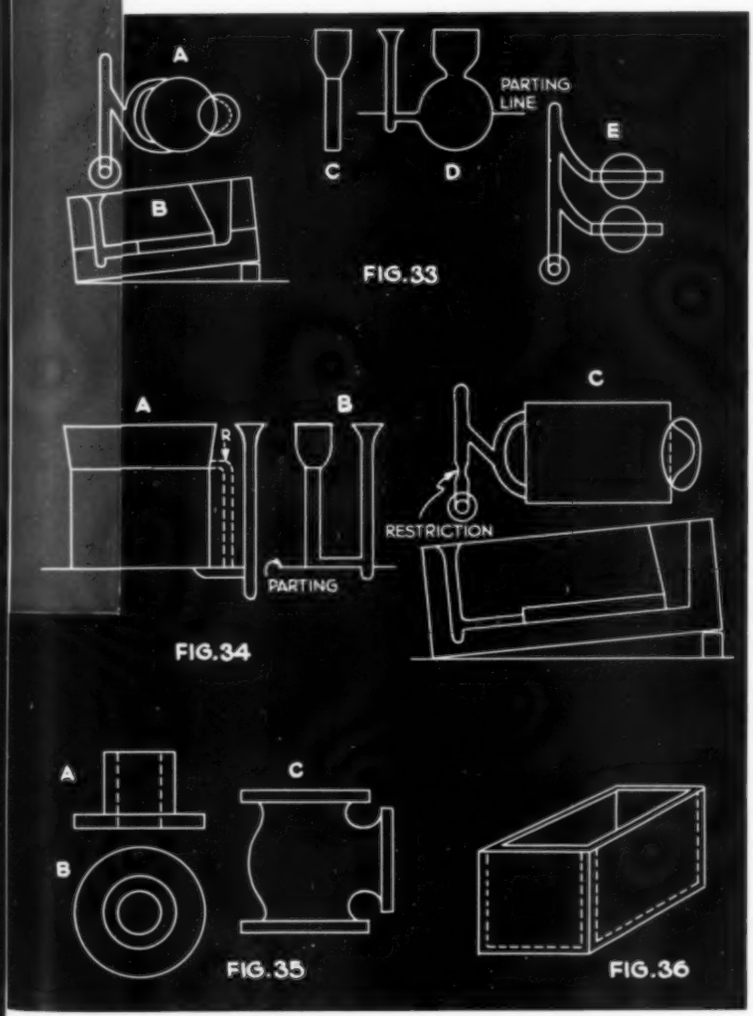
IN PREVIOUS articles dealing with gating of nonferrous castings the author has tried to show the advisability of careful study and to convince readers of economies to be derived from such a study. Reduction in defective casting loss is, of course, the major opportunity of saving of expense but the cost of removing the gates and risers from the casting is frequently quite a definite item. If that cost is borne in mind when gating is being determined there can be savings made by the choice of the right location or shape of the gate or gates.

We have also emphasized the importance of leading the metal into the mold in the right direction to develop the proper heat gradient so that cooling and solidification will take place at the proper rate and in the proper location to insure proper feeding. Some typical examples have been illustrated but it is believed that details of specific instances of gates which could be used on the same casting in different ways or different gates that could be applied to the same castings may help.

For example, Fig. 29 illustrates a gate of

Is Important

By N. K. B. PATCH



small bushings, or it could be solid castings without cores attached to a central runner in several ways. The runner is located in the cope and the gates from the runner to the castings in the drag. In *A* the gates from the runner lead backward from the direction of flow from the sprue through the runner. That means that the first metal poured down the sprue runs down the gate to a blind end and if, perchance as is often the case, the first metal poured is dirtied by the presence of some loosened sand or a definite drop that material travels to the end of the runner and is not carried into the casting.

As soon as the metal stream becomes continuous and uniform the whole runner is filled and the metal passes from the runner through the gates to the several castings. It is well to point out here that the runner and sprue should be proportioned so that an ample supply of metal is insured for all gates from the runner.

The gates may be connected to the casting in several ways as illustrated at *D* and *E*. At *D* the gate is at the end of the bushing so that a saw can quickly remove the gate by a straight cut. In *E* the gate is attached to the casting at its side on a rounded surface and therefore a straight cut would still leave a small piece of metal on the curved surface of the casting. That would have to be removed later by an additional operation of grinding as compared with the case of *D*.

Certain Alloys Require Feeders

In *B* and *C* the end view of the gates are shown. In *B* no riser is provided but in *C* a dotted outline of a riser is indicated. Those two illustrate the position in which the riser would be located if the metal being cast is such as to require more feeding than is available by the runner when the runner acts as a feeder head. High shrinkage alloys would necessitate a riser, whereas the low shrinkage alloys as the red brasses would not necessarily require feedheads.

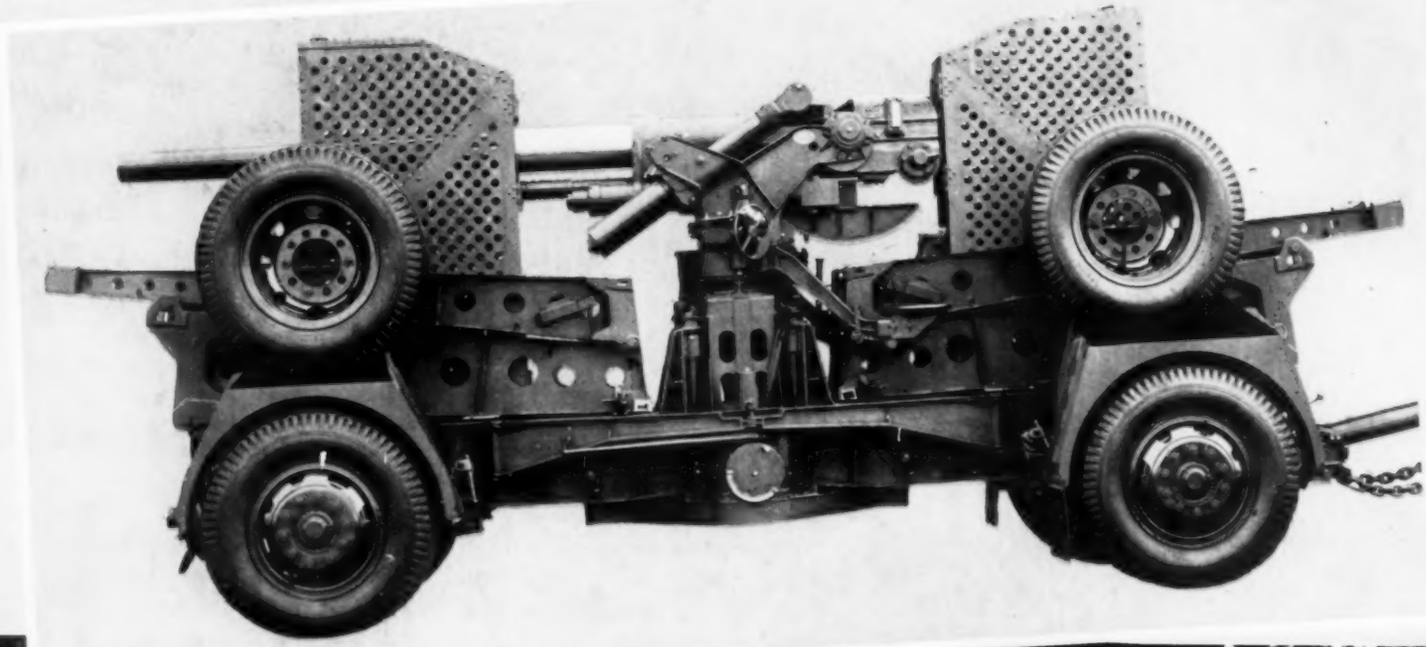
If the mold is to be located in an inclined position then it might be desirable to change the gating so as to have the metal enter from the bottom of the mold cavity. That is illustrated in *F* so that as the metal enters the mold from the sprue and runs down the runner it is led through the gate into the lower end of the mold, assuming that the sprue is at the higher end.

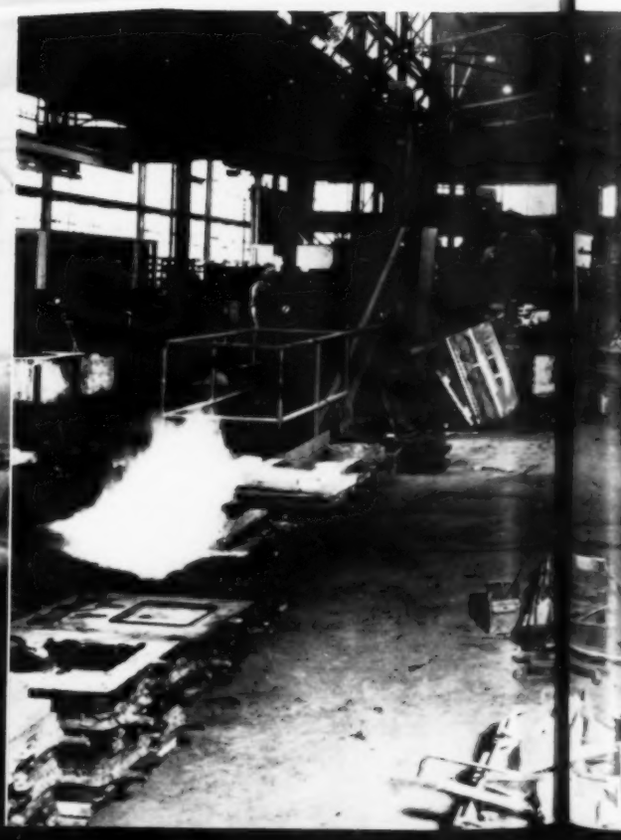
In addition several methods of gating are shown in Fig. 29 whose choice would be influenced by the cost of the removal of the gate and by the weight, shape or section of the casting being cast. The heavy section casting necessarily would have to have large gates and possibly have large risers as indicated at *C* in the dotted line. With such risers present there might be cramped space for the saws to operate in the removal of the castings from the gates.

Therefore, a choice is outlined as in *F, G, H, J* and *K*. At *M* is indicated a suggestion of a method of casting bushings on end instead of on the side as is frequently done. Two methods of gating are shown with the full line indicating a right angle flow of metal from runner to casting and the dotted outline the acute angle connection of the gate with the runner so that the metal passing down (*Please turn to page* 172)

Defense Program Affects

Nonferrous Foundry Industry





By WILLIAM J. LAIRD
Metallurgist
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

THE position now occupied by the nonferrous foundry industry in the United States due to the defense program is one which has had no parallel in its history. Production of the type of part demanded in that program coupled with advances in materials and methods have made the typical casting as much a utility part as that of the steel foundry and any vestige of ornateness as a license to exist has gone from the industry.

Although the output of castings in the field has more than doubled in the past year, new manufacturing facilities have not been added as yet in anything approaching the order of increase in volume of business, and this additional work has been as a result superimposed upon facilities already existing. The bulk of the defense load appears to be concentrated in the East and upon the two Seaboards. New construction, particularly in the Middlewest make it appear that the work will be more evenly distributed within the present year.

Attempting to meet these conditions the brass foundry, traditionally a one shift operation, has in many cases gone to two and in a few instances, three shifts, or continuous operation. The major problems presented under this scheme from an operating standpoint are: Training of great numbers of new people; and maintenance of control over the longer operating period.

That these two major operating problems will be met successfully is already evident. The type of individual entering the industry in its present expansion is of high caliber generally and when fully adapted cannot do other than improve the standard of men and product.

Establishing control is a costly procedure, and is a function of new operators and heavily taxed operating facilities. That the product has suffered so little sacrifice in quality is a tribute to the industry.

Effect Not Fully Apparent

From a metallurgical standpoint, the effect of the defense program on the industry is not as yet fully apparent but there is little doubt that it will have a marked influence. With the major portion of the normal alloy ingredients already labeled strategic, the composition trends in non-defense work or in work remotely related to defense, will change the operating picture seriously. The surge in the light alloys due to the necessary mobility of much of the defense equipment will have a grave effect on non-defense work generally.

The increasing importance of the high strength, tin-free copper base alloys and their widespread specification for work both defense and non-defense, have made those alloys of keen interest to nonferrous foundrymen generally and developments in this (*Please turn to page* 161)

Fig. 1 (Left)—This 3-inch gun without mount weighs 13,065 pounds of which bronze castings weigh 258 pounds, manganese bronze castings weigh 396 pounds, and aluminum alloy castings weigh 342 pounds. Fig. 2 (Left below)—Revolving pouring table used on plated machine work. Fig. 3 (Below)—Nonferrous foundry set up making castings under a sand-slinger shown in the background with accompanying conveyor and drying floor. Fig. 4 (Right below)—Removing large heads with electric arc

QUESTIONS and ANSWERS

Desires Information on Methods Of Making Aluminum Bronze

We operate a foundry in Belgium and would appreciate information on the methods used in the United States for the production of 90 per cent copper and 10 per cent tin; aluminum bronze containing 89 per cent copper, 10 per cent aluminum and 1 per cent iron, and special aluminum bronze containing nickel and manganese.

In general the various bronzes mentioned are melted under slightly oxidizing conditions to prevent absorption of gases, which is indicated by the appearance of small pinholes just under the surface. We believe that with the proper melting conditions you will have no difficulty in producing good, sound castings. The 90 per cent copper-10 per cent tin alloy usually is deoxidized with a small amount of phosphorus of which one-half is added to the copper after it is molten, and before the introduction of the tin. The remaining half of the phosphorus is added just a few minutes before pouring. The straight copper-tin alloy mentioned is rather difficult to pour into intricate sections, and substitution of 2 per cent zinc for a like amount of copper will overcome the trouble. Then the alloy becomes the well known 88-10-2.

Production of aluminum bronzes requires considerable experience to produce a satisfactory product, but by careful work, you probably can gain the necessary skill. Several methods are available for making aluminum bronze, and include use of ingot material, virgin metals, and virgin metals plus hardeners. In the use of virgin metals the copper is melted first under charcoal and after it is molten approximately 0.3 per cent manganese in the form of high grade manganese-copper is used to deoxidize the copper. Then the iron is added to the molten copper in the form of thin, tinplate clippings which are pushed under the surface and stirred in well to get them into solution as rapidly as possible. A less difficult procedure of adding iron is to employ an alloy containing 90 per cent aluminum and 10 per cent iron.

After the iron is added the aluminum is added in little pieces, a small amount at a time to prevent the temperature rising too high. While the completed alloy can be poured directly into castings after thorough stirring, it is advisable to pour it into ingots first, and remelt those ingots for making castings. Production of the special aluminum bronzes containing nickel and manganese is similar to the method described except that the nickel and manganese are melted with the copper. One alloy which we understand is being used to some extent for certain purposes contains 80 per cent copper, 10 per cent aluminum, 5 per cent nickel and 5 per cent iron. As might be expected there are a variety of alloys included in the term aluminum bronze which contain in addition to the usual elements nickel, manganese, vanadium, etc. Many of those are patented, and it may be well to investigate that phase.

Castings for Boiler Sections Blow off Small Chaplets

Metal blows around chaplets on our boiler castings. These are stud chaplets ¼-inch in length and tinned. They seem to collect moisture when allowed to stand any length of time.

Since thousands of these chaplets are used every day, especially in foundries engaged in the manufacture of boiler castings, heater sections and others of a somewhat similar character, we are rather at a loss to determine why they should cause trouble in your case. If you are quite satisfied that they collect moisture, the obvious remedy is to manipulate the sand in a manner to prevent condensation. Under normal conditions where sand and atmosphere are at approximately the same temperature, no condensation will take place on the chaplets. Where the sand is warm and the chaplets are cold, a certain amount of moisture will collect on and adhere to the chaplets or any other metal inserts.

However, the amount usually is small and is evaporated by the hot metal before it can do any harm. Rust is a more prolific cause than moisture for blow holes in the vicinity of chaplets. Carelessness is largely responsible. The chaplets are piled loosely in damp, rust producing localities, instead of being kept warm and dry. Sometimes they are placed in the mold with wet fingers. We are inclined to the opinion that if you examine the chaplets critically and reject any that show the slightest indication of rust; if you keep the chaplets in a warm, dry storage area and see that they do not pick up any moisture before they enter the mold, you will not find blow holes in the castings in the vicinity of the chaplets.

Fractured Malleable Iron Casting Shows Different Structures

We are sending you two pieces broken from a malleable casting. As indicated by the holes in the light piece we have taken drillings and the following is the analysis: Silicon, 0.86; sulphur 0.089; phosphorus, 0.147; manganese, 0.37; total carbon, 2.49; combined carbon, 0.03; graphitic carbon, 2.46. We are unable to understand the appearance of the fracture of this light piece in view of the foregoing analysis. Can you tell us why the fracture looks like this and whether or not there is anything in the analysis to account for it? In reference to the heavier piece we are sending: As you will see there is a considerable difference in the appearance of the fractures at the two respective ends. We have hammered the castings from which these two pieces were taken quite vigorously and the metal appeared to be very strong and quite ductile.

It is quite possible that the white fractures about which you inquire may be examples of what sometimes is called galvanizing embrittlement. This embrittlement is not limited to galvanizing, but occurs when castings are cooled rather quickly from temperatures around 450 or 500 degrees Cent., (840 to 930 degrees Fahr.). When the same casting is cooled quickly from higher temperatures, as in a certain proprietary process, the white fracture disappears. You might well experiment by quenching some castings having a white fracture from exactly 1200 degrees Fahr. and observing whether the difficulty thereby is cured. The tendency to white fracture increases with increasing phosphorus and silicon and perhaps with other less understood variables. The analysis quoted is not one which should be particularly likely to give this trouble.

Must Consider Many Factors in Making Grate Bars

Some of our customers complain that the grate bars we make burn out too rapidly. What kind of iron is needed in long life grate bars where coal is employed as fuel?

In a broad, general sense the customer always is right, but instances turn up occasionally to prove that this rule may have exceptions. Although the quality of the iron is the main factor in the life of a grate bar and therefore up to the foundryman, other factors introduced by the customer may be responsible for failure of the bars in service. Defective design, especially in providing proper air space, a factor over which the foundryman usually has no control, frequently wrecks perfectly good bars. Ignorant method of manipulating the fire will do the same thing. Certain grades of coal are more destructive than others. The cost of the bars in a fiercely competitive market may be a deciding factor.

Where the castings are purchased strictly on a price basis, the foundryman, although anxious to supply a superior product, must trim his sails to meet market conditions. If his cost is 3 cents per pound and he is forced to sell at 2 cents, he is better off without any grate bar account. Replying to your specific question, iron of the following approximate analysis, with bessemer pig iron as a base, has proved highly satisfactory for grate bars: Total carbon 3.50 per cent, silicon 2.00 per cent, manganese 0.60 per cent, sulphur 0.05 per cent, phosphorus 0.20 per cent. In recent years many foundrymen have produced alloy cast iron grate bars which show a life approximately 3 times greater than ordinary cast iron. Typical analyses show: Total carbon 3.00 to 3.20 per cent, silicon 1.40 to 1.60 per cent, combined carbon 0.75 to 0.85 per cent, sulphur 0.10 maximum, phosphorus 0.20 per cent maximum, manganese 0.60 to 0.80 per cent, nickel 1.40 to 1.60 per cent, chromium 0.40 to 0.60 per cent. Total carbon 3.50 per cent, silicon 1.50 per cent, manganese 0.70 per cent, chromium 0.35 per cent and molybdenum 0.30 per cent. Total carbon 3.25 per cent, silicon 1.75 per cent, manganese 0.70 per cent, chromium 0.50 per cent and molybdenum 0.40 per cent.

Slag Carried in by Molten Iron Spoils Large Piston Casting

We are forwarding a piece broken from the wall of a piston casting ¾-inch thick, weighing approximately 600 pounds. The mold was dry sand and the metal was poured through ½-inch pop gates. Same type of defect occurs when the casting is gated at the bottom. The defect appears near or immediately above the bottom gate. The majority of the castings are clean. Since our iron, melting, pouring and molding practice are satisfactory and show no variation from day to day, we are at a loss to account for these occasional wasters.

Holes and slushy areas in the casting are caused by slag in the iron or by a slushy sand compound washed in from the runner basin. Reference to the care exercised in all phases of your general foundry practice would lead to the assumption that the ladle is skimmed and therefore no slag enters the pouring basin. Experience on other jobs lead to the conclusion that the pouring basin is not quite perfect. A small amount of sand is washed up with the stream and enters the mold. This foreign material would float to the top if no obstacle was in the way.

In this instance the obstacle is the narrow space between the inside and outside walls of the mold. The foreign material is enveloped in the film which always covers flowing iron on the top and which becomes rather viscid where it cools in contact with the mold face. The foreign material sticks to the face and the remainder of the iron flows past. This theory is supported by the fact that when the casting is gated at the bottom, the defective area is found in the vicinity of the gate.

Obviously the remedy is to exercise more care in the preparation of the pouring basin. The pop gate is preferable to a gate at the bottom. A dry sand pouring basin is preferable to a green sand basin, but where proper and intelligent care is exercised the green sand basin should deliver clean iron to the gates. For the small amount of trouble involved it might be worth your while to stand small plugs in the gates and leave them there until the basin is filled with iron. Any foreign material will float on the top and so long as the basin is kept filled, clean iron will flow down through the gates.

High Lead Bronzes Produced Easily

Although we have experienced no trouble as yet in meeting the demand for increased lead content in bearing bronze, we read with much interest the answers to questions submitted to your department on this subject. Among the numerous elements that we have been told are used in treating lead to make its use in larger percentages practical in bronze mixtures are bismuth, plain salt, arsenic, salamoniac, resin and fat pine sawdust. We would like to know if you have any information that you could give us in connection with the use of any of the above for the purpose mentioned.

Treatment of lead is a subject that has been discussed widely and there are many claims made for the beneficial effect of many different materials. As a matter of fact, good, sound, satisfactory bearing bronze castings containing lead in varying quantities are made regularly without treating the lead in any way. Manufacturers are very careful about the practice in the production of the alloy by controlling the melting conditions and by using the right materials in productions of the alloy. Some depend upon the presence of an oxidized copper by adding the copper oxide to the molten copper, some bubble air through it while it is molten, and others use chemicals, such as barium sulphate as a source of oxidation of the copper; for there is a definite value in having present copper oxide in appreciable quantities in effecting the suspension of the lead in the final casting.

Use of bismuth has been suggested, but in reality it would tend to make the lead more liquid at the temperature at which it is fluid and, therefore, it would be carried more readily to the bottom of the casting by gravity. Arsenic definitely causes the lead to be extremely fluid and thin, and will increase liquidation of the lead. Resin or fat pine sawdust has been used in the process of the refining or cleaning a bath of solder or lead base alloys since it to some extent reduces lead oxide to metallic lead. It hardly would be expected that the removal of the drossy oxides from the lead before adding it to the high lead bearing bronze would have very much effect in increasing suspension of the lead or the more even distribution of the lead in the bearing bronze. Salamoniac like resin also is used for fluxing drosses and cleaning the baths of lead-base alloys and has some value when refining old scrap material. A first-class, clean lead hardly would need any treatment of this kind.

There are those who suspend lead in bearing bronzes by the addition of sulphur in fractional percentages of the bearing bronze and some who claim beneficial effect by the addition of certain elements to the lead previcus to adding it to the bronze. Accurate and careful metallurgical control, coupled with good equipment in the hands of experienced men will produce a good product even though some of these so-called secret processes are not being used.

Skill Required To Make Safety Treads

We have been experimenting with safety step treads made in a sand mold, using aluminum oxide abrasive for the proper roughing up of the casting. Can you give us the proper mixture for that class of work, and also the proper binding agent for holding the abrasive in the mold? Should the abrasive be placed in the cope or in the drag, and what is the proper size of abrasive to be used?

You do not mention what alloy is employed for the castings, and that will make some difference in your method of attacking the problem. Successful production of abrasive faced treads requires considerable experimental work to iron out various troubles encountered, and to establish a definite procedure — and hence we can only describe the general aspects.

The abrasive used may be either silicon carbide or aluminum oxide, and the grain size may range from 12 to 30 mesh depending upon the coarseness of surface desired. General practice is to place the abrasive on the drag face, and the procedure is to first spray the sand face with some type of binding agent which may be a thin solution of sodium silicate (water glass), clay wash, molasses, etc. Then the abrasive is put in place by screening or sieving a thin layer over the mold surface. The screen or sieve used should be the same mesh size as the abrasive to insure proper distribution.

Then the mold surface with its coating of abrasive is torch dried to insure that all moisture is driven off. If desired a second thin layer of abrasive can be applied in the same manner, or it may be placed directly over the first before drying —using the binding agent in any case. After drying the mold is ready to be poured, and the metal should be as hot as possible to insure proper penetration between the abrasive grain and to cause a partial fusion between abrasive and binding agent. If bronze is the alloy you intend to use, we believe that a slight excess of phosphorus above that required for deoxidation will give better results due to greater fluidity and penetration or *searching* tendency.

Making Manganese Bronze Rudders

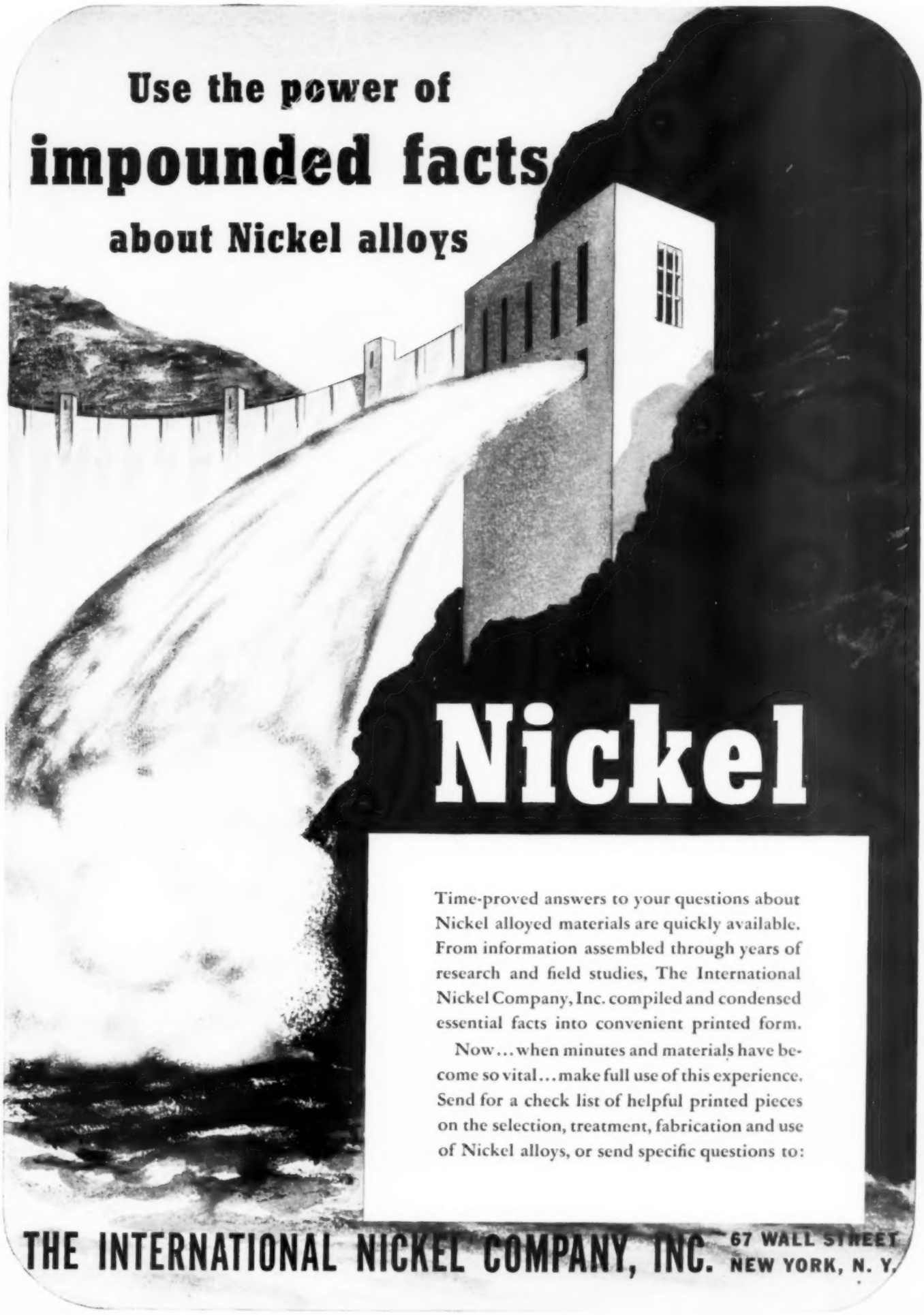
We have received an order to supply six manganese bronze rudders, Navy specifications, and request that you give us all information as to the best method of and where to place the gates and risers with sizes, etc., to obtain the best results. We have not been called upon to cast manganese bronze of this type before, and any information that you are able to give us will be greatly appreciated.

The Navy specification for manganese bronze gives some leeway in the chemical composition so that there should be no trouble meeting the physical requirements. Best practice is to make the alloy up in sufficient quantity and pour it into ingots. Analyze the ingots if you want to be very certain of their meeting specifications but at least when you get ready to melt for production of the castings mix the ingots thoroughly so that all of the ingots from any one charge are not confined to any particular casting.

In gating of the rudders we suggest that the blade end be a little bit lower than the stem end when the mold is in the pouring position. A riser should be placed wherever a thick and thin section join, but of course, that is not convenient or entirely possible in every instance. Therefore, a compromise must be adopted. A riser where the blade joins the stem is absolutely necessary as also a riser at the bottom and top ends of the stem. Risers should be filled with hot metal after they have been filled partially by the regular pouring through the gates.

Gating should be such that the metal enters the low end of the mold first at the bottom of the rudder and fills the blade gradually filling toward the upper end of the stem. It should also connect with each of the risers. The gates should be of such size as will insure a free flow of metal into the mold but at the same time they must be small enough to freeze long before the casting. The risers must be high enough, say 12 or 15 inches above the casting to force the metal into the casting as cooling takes place and the need for feeding is made necessary.

It is impossible to give absolute size and all other details without knowing the condition of the pattern, the flask available and all the other variables. However, you should have no trouble in deciding upon an adequate size of riser. For example, a riser to feed a 4-inch thickness at the point where the stem and blade join must be at least 6 inches in diameter and the connection between the riser and the casting must be such that it will not freeze until after all feeding requirements have been satisfied.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MEN OF INDUSTRY

GEORGE G. BENNETT recently returned to Jones & Laughlin Steel Corp., Pittsburgh, as assistant foundry superintendent. He was away from the Pittsburgh district for 4 years and during that time was foundry superintendent, Warman Steel Casting Co., Los Angeles, and more recently foundry superintendent of the Long Beach Iron Works, Long Beach, Calif. He first became connected with the Jones & Laughlin Steel Corp. in 1923 after spending some time as a journeyman molder in New England.

♦ ♦ ♦

FRANK G. STEINEBACH, editor of THE FOUNDRY, recently was appointed Chief, Foundry Equipment and Supplies Unit, Tools Section, Division of Production, Office of Production Management, Washington.

♦ ♦ ♦

HARRY E. ORR recently has been appointed sales engineer, Vanadium Corp. of America, New York, with headquarters in the organization's Chicago office. Mr. Orr for the past 7 years was chief metallurgist for the Burnside Steel Foundry Co., Chicago.

♦ ♦ ♦

S. H. HAMMOND, until recently manager of the appliance division, Whiting Corp., Harvey, Ill., now is in charge of all Whiting branch offices and sales representatives, with the title of director of the field force. Mr. Hammond has been with the company for 15 years, mostly in a sales supervisory capacity. New directors in addition to Mr. Hammond are: R. A. PASCOE and W. L. BADGER. Mr. Pascoe, who is also controller, has been with the company for 24 years and has been secretary for many years. W. L. Badger, a former professor of chemical engineering, University of Michigan, has been associated with the Swenson division of the company. He has been in charge of all development and research activity pertaining to the process industries. M. F. BECKER, vice president, has been promoted to co-manager of the equipment division. Mr. Becker, formerly field force director, has been with the company over 20 years with extensive engineering and sales experience on foundry equipment and pulverizing machinery.

♦ ♦ ♦

NORMAN J. DUNBECK, vice president, Eastern Clay Products Inc., Eifort, O., selected by the A.F.A. to prepare the annual exchange paper on "American Synthetic Sand Practice" for the Institute of British Foundrymen was born into a family of foundrymen and as a child played in foundries. He took his first foundry job at the age of 15, and thereafter worked during vacations through high school and college. Following graduation as a chemical engineer from Catholic University, Washington, in 1924, he worked for a time at the Donner Steel Co. in Buffalo, and at Symington-Gould Corp., Rochester, N. Y. In 1926 he became connected with Eastern Clay Products Inc., to take charge of research and tests. For a year or two he was in charge of production, following which he did foundry sand service work for approximately 10 years. Mr. Dunbeck was elected a vice president of the corporation in 1938. He is a member of the American Ceramic Society and has served as a member of the executive committee and various sub-committees of the sand research committee of the A.F.A. He has written several articles for the technical press and has addressed many A.F.A. chapter meetings and regional conferences.

♦ ♦ ♦

W. CARTER BLISS, formerly manager, Scullin Steel Co., St. Louis, has resigned and now is connected with the St. Louis office of OPM.

♦ ♦ ♦

JAMES P. GILLIES has been appointed to assist in general sales activities of the Chicago Pneumatic Tool Co., New York.

♦ ♦ ♦

VICTOR N. CLYNE, formerly of Warren, Pa., recently has retired after serving 47 years in the foundry business. Mr. Clyne has been employed the past 12 years with the Pomona Pump Co., Pomona, Calif.

♦ ♦ ♦

WILLIAM J. FLOWER, JR. recently has returned to the pattern department of the Coshocton Iron division, Combustion Engineering Corp., Monongahela, Pa., after a short period

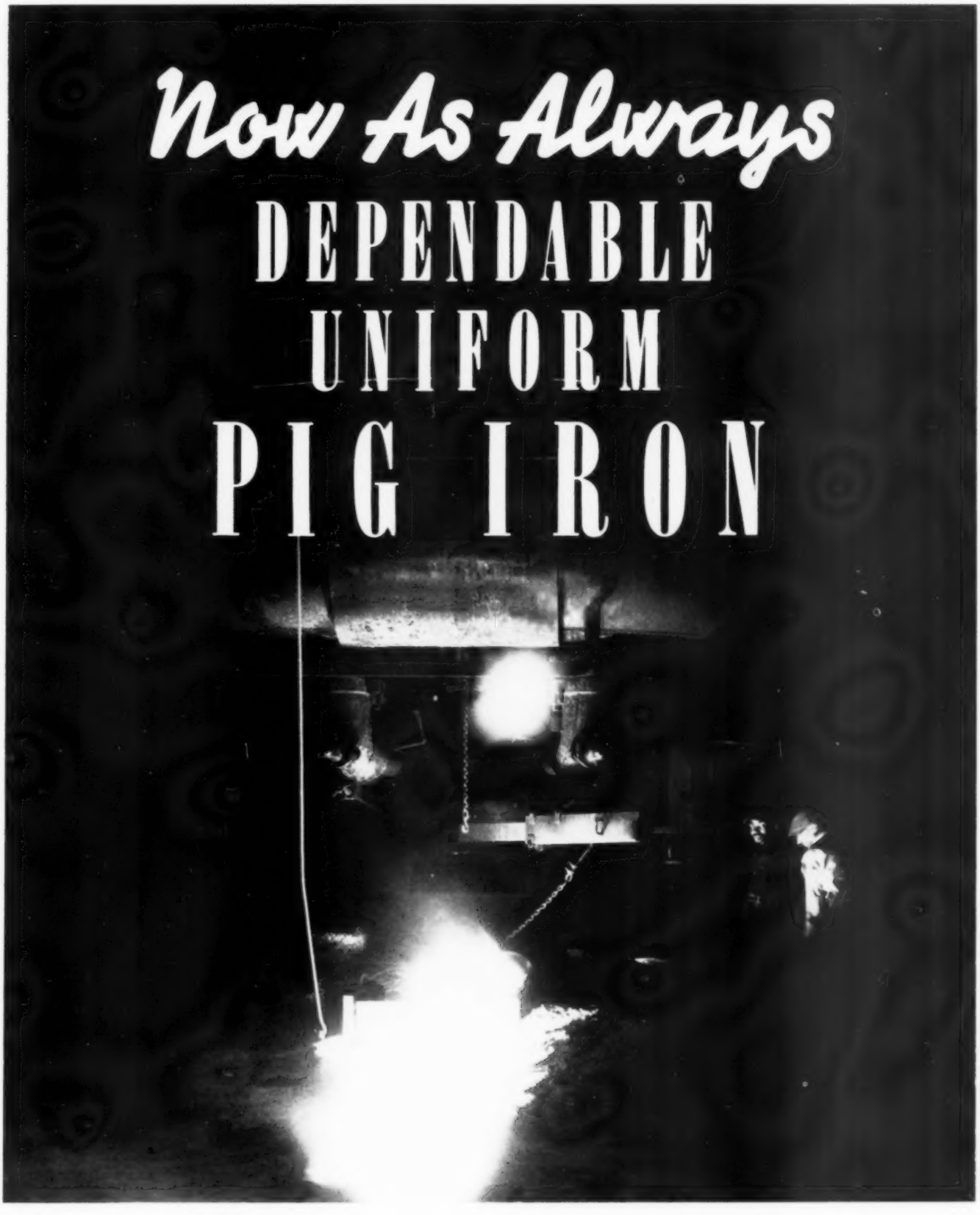
(*Continued on page* 102)

S. H. Hammond

N. J. Dunbeck

Harry E. Orr

M. F. Becker



WOODWARD IRON COMPANY

WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

INDEPENDENT SINCE 1883

(*Continued from page* 100)
with the Ideal Foundry & Machine Co. division of Republic Steel Corp., Beaver Falls, Pa. Mr. Flower served as an apprentice with the American Steel & Wire Co., Donora, Pa., and worked for various periods for local firms. He returned to American Steel & Wire for several years, and then became connected with the Crown Cork & Seal Co., Baltimore, where he worked for 2 years on bottling machinery patterns.

♦ ♦ ♦

ANDREW HUTTON has been appointed works manager of the Robins Conveying Belt Co., Passaic, N. J., to be in charge of all manufacturing operations, buildings and equipment.

♦ ♦ ♦

ROBERT R. FAUNTLEROY, president, Moline Malleable Iron Co., St. Charles, Ill., has been elected a director of the newly reorganized Chicago Great Western railroad, Chicago.

♦ ♦ ♦

LOU R. O'CONNOR, 2109 Boyer avenue, Seattle, Wash., has been appointed representative of Ampco Metal Inc., Milwaukee. His territory will include Washington, Oregon, Idaho, and western Montana.

♦ ♦ ♦

A. M. HERRMANN recently has been appointed general factory superintendent, Brillion Iron Works, Inc., Brillion, Wis. For the past 17 years Mr. Hermann has been with the Belle City Malleable Iron Co., Racine, Wis.

♦ ♦ ♦

W. ALEXANDER MCCUNE JR. has been appointed field engineer for the Philadelphia territory by the Abrasive division, Norton Co., Worcester, Mass. Mr. McCune was in the laboratories and sales engineering department in Worcester before going to Philadelphia.

♦ ♦ ♦

DR. H. A. H. PRAY has been named head of a new division of electrochemical research at Battelle Memorial Institute, Columbus. Dr. Pray, who has had years of experience in physical and inorganic chemistry as related to industrial problems, has been a member of the Battelle staff since 1934.

♦ ♦ ♦

L. M. LINDSEY has joined General Alloys Co., Boston, as engineering sales manager. The past 6 years he was associated with Surface Combustion Corp., Toledo, O., in charge of the malleable iron annealing, nonferrous wire open flame annealing and vitreous enameling furnaces divisions. Previous to that he was sales engineering executive with Holcroft & Co., Detroit. ROGER SUTTON, formerly metallurgist, Chrysler Corp., Detroit, has become director of engineering and metallurgy of General Alloys. HAL G. CHASE has been transferred from the western territory to Boston as assistant to president.

♦ ♦ ♦

DANIEL PETERKIN JR., vice president, Morton Salt Co., Chicago, has been elected president to succeed his father, Daniel Peterkin Sr. who died recently. B. W. CARRINGTON, senior vice president, was made chairman of the board, and J. A. CLEMENTS, vice president, was named executive vice president.

♦ ♦ ♦

A. E. DAY has resigned from the sales department of Mesta Machine Co., Pittsburgh, and has been appointed vice president and sales manager of the National Roll & Foundry Co., Avonmore, Pa.

A. E. Day

♦ ♦ ♦

JAMES T. DUFFY, president and general manager, Read Machinery Co., York, Pa., is president of the newly formed Colonial Casting Co., which soon will reopen the former Susquehanna foundry on Hanover street, New Oxford, Pa. HARRY B. ALLISON is manager of the new company.

♦ ♦ ♦

EDWARD B. MORROW, assistant treasurer of Hercules Powder Co., Wilmington, Del., recentiy was elected treasurer and a member of the executive committee, succeeding Charles C. Hoopes. FRANCIS J. KENNERLEY, comptroller, was elected an assistant treasurer. He will continue as comptroller. Other officers were reelected for the ensuing year.

♦ ♦ ♦

DR. ARMAND DIGIULIO, until recently research metallurgist with Ford Motor Co., Dearborn, Mich., now is associated with the research laboratory of Bundy Tubing Co., Detroit, as special assistant to Dr. R. H. Hobrock, vice president in charge of research and production. Dr. DiGiulio is a graduate of the University of Michigan.

♦ ♦ ♦

JOHN W. PERRY JR. has been appointed vice president, Grede Foundries, Inc., Milwaukee. Mr. Perry has been general sales manager of the company and its subsidiary, Milwaukee Steel Foundry Co., having been with the organization since 1936. He will continue in charge of sales for the foundries, including the Liberty Foundry, Wauwatosa, Wis., and the Spring City Foundry, Waukesha, Wis., both operated by the Grede company.

♦ ♦ ♦

HARRY L. STRUBE has been appointed chief engineer of the Link-Belt eastern division, with headquarters at the company's Philadelphia plant, to succeed F. F. WAECHTER, who has resigned after rounding out 43 years of service. Mr. Strube began his service in the engineering department of the company's Pershing road, Chicago plant in 1910. Subsequently he served as sales engineer, first at Chicago, and then in Philadelphia. In 1924 he rose to the position of manager of vibrating screen sales, and in 1934, was made assistant chief engineer at Philadelphia.

♦ ♦ ♦

R. J. KEELEY, metallurgist, Ajax Metal Co., Philadelphia, has served the past year as chairman of the Metropolitan Philadelphia Chapter of the A.F.A. Mr. Keeley was born in Oxford, Pa., and received his education at St. Agnes high school, West Chester, Pa., and Central high school, Philadelphia, where he took a 10-year evening course in chemistry under the late Dr. Harry F. Kellar, professor in chemistry. Mr. Keeley joined the Ajax Metal Co. as assistant chemist in 1905, became chief chemist in 1910, and since 1925 has served as metallurgist for that company. Since his connection with the Ajax company he has worked under the personal direction of Dr. G. H. Clamer. From 1920 to the present time he also has been engaged in sales promotion activities in the field which includes general service to the customers of the company. Mr. Keeley has prepared and read several papers before A.F.A. chapters and local groups pertaining to nonferrous melting and foundry practice, and is a member of the A.I.M.E. as well as the A.F.A.

Jenks, Knipschild & MacCowan Inc. has been organized with offices at 75 East Wacker drive, Chicago, to provide industrial design service for manufacturers that includes both styling of products and their promotion by advertising. Roy W. Knipschild is president, Al Jenks,

(*Concluded on page* 104)

Cast Chromium-Molybdenum steel offers a simple, economical solution to knotty problems

Flame hardened Chromium-Molybdenum Steel (1.00% Cr-0.40%-Mo.) has simplified the manufacture of high grade drive sprockets for heavy duty hoisting machines.

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Our technical book, "Molybdenum in Steel" will be gladly sent free on request.

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Climax Mo-lyb-den-um Company
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MOLY

(*Concluded from page* 102)
vice president, Hervey L. MacCowan, treasurer and Henry Olczak, secretary. Mr. Jenks and Mr. MacCowan have had more than 12 years' experience product design, a considerable part of which involved use of metals and related materials.

Gray Iron Minimum Wage Recommended

The gray iron jobbing foundry committee composed of fifteen members representing the public, employers and employes in a report filed with the Administrator of the Wage and Hour Division, Department of Labor on April 3 recommended a 40-cent minimum wage for the gray iron jobbing foundry industry. Sidney E. Sweet, St. Louis, was chairman of the committee. The gray iron jobbing foundry industry is defined as the "manufacture of ferrous or ferrous base castings, rough and finished, except malleable iron castings, steel castings, pipe and fittings, for sale by the producer but not the manufacture of the same for use by the producer in the fabrication of other products or parts thereof." Foundries which are operated solely for the production of castings which are used by the same concern in the manufacture of other products, are not within the definition.

READER'S COMMENT

Readers are invited to comment upon articles and other editorial material appearing in THE FOUNDRY. *The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief.*

THE EDITORS

Short Cuts

TO THE EDITORS:

"Every little short-cut has a saving all its own."

In times like these, ideas are worth more than men or machines, but the problem is to get ideas for workmen, due, no doubt, to their being bashful or having an inferiority complex that makes them afraid to give suggestions that might be turned down.

In numerous cases, foremen and time-study men have laid out jobs and a short time after work was put into production, it was found that the workman had made some slight change or was using some idea of his own to speed up production. As it is becoming much more difficult to get new machines and trained men, no doubt production could be stepped up if workmen could be encouraged to think and then give up any new ideas, receiving pay for ideas used.

In 1916 I was visiting a large steel foundry near Chicago where the superintendent, an ex-Britisher, and I were discussing the war. We agreed that any savings effected, especially on the conservation of labor, certainly would be worth while. The writer suggested that he put a shakeout grating opposite the sand mill with a belt conveyor underneath to take used sand back to the mill. I visited that plant about a year later, and my friend immediately showed me where the layout suggested had been applied. This change enabled them to charge three to four, 7-ton open-hearth heats with four men. These same four men later took care of the shaking out of the molds just cast. This installation of the grating resulted in saving considerable labor on each shift.

The mechanical department of a large car company transferred from the malleable foundry to the steel foundry a pattern for body center plate. This pattern was about 12 inches wide, 24 inches long, with the plate portion $\frac{3}{8}$-inch thick, on which there were $\frac{1}{8}$-inch thick bosses around rivet holes. The steel foundry had considerable trouble due to misruns, because of the $\frac{3}{8}$-inch thickness, and the car company was asked to increase the $\frac{3}{8}$-inch dimension to $\frac{1}{2}$-inch. This was done. Then I suggested removal of the $\frac{1}{8}$-inch bosses, and upon being asked why, said, "To save weight." This seemed rather absurd on one casting, but as there were 4000 center plates, we found the removal of 32,000 washers meant a saving of approximately $250. The bosses were removed.

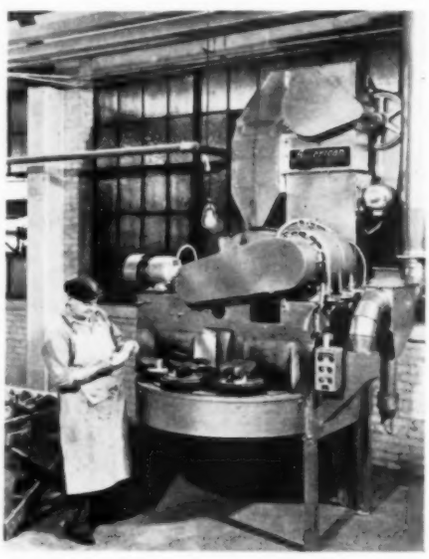
J. S. MACFARLANE

Canadian Car & Foundry Co. Ltd.
Montreal, Que.

Air Hygiene Foundation, Pittsburgh, recently has published its third report on industrial health defense which is entitled, "Fatigue in Industry," by Dr. J. R. Garner. The report analyzes fatigue and points out losses due to that cause frequently are ascribed wrongly to other factors. The report also outlines methods to lessen fatigue in industry.

Magnesium Is Used For Shoe Lasts

About 25 years ago the George C. Clark Metal Last Co., developed a metal last to take the place of the ordinary wood last in the manufacture of rubber foot wear. The company it is claimed is now the largest manufacturer in the field with plants at Mishawaka, Ind., Walkerville, Ont., and a design office at Brockton, Mass. Later, several interesting problems arose when the company decided to make metal lasts for leather shoes. Unlike rubber, the leather insole has to be tacked to the last. On account of light weight the lasts are cast in magnesium. To increase the wearing properties a thin coating of steel is metallized over the surface. Then small bosses are cast on the last face. These are drilled and plugged with a rubber and leather composition to form tacking points. Early attempts at metallizing failed because it was impossible to secure a perfect bond between the two metals. After several attempts to roughen the magnesium surface a solution was discovered in a table type abrasive blast machine manufactured by the American Foundry Equipment Co., Mishawaka and shown in the accompanying illustration. The lasts are mounted in pairs on small revolving devices attached to the table and are subjected to a stream of No. 18 metallic grit. Rotating speed may be regulated according to conditions.



Rotary, table type abrasive blast machine is employed for obtaining desired surface on shoe lasts

The General Electric X-Ray Corp. is building a 5-story addition to its building West Jackson boulevard, at an estimated cost of $450,000.

HOW TO GET lead OUT OF feet

WE MEAN that you can get the lead out of the feet of any core room . . . and out of bake ovens, too . . . and cleaning rooms.

Whole flocks of foundries from this coast to that, and all in between, are doing it now . . . cutting costs . . . turning out more production . . . with higher quality. It's as simple as this!

Convenient-size Bag Is Easy to Handle

Just write your name in the handy coupon at the bottom of this page, pin it to your letterhead, and mail it to us *quickly*. We'll see that you get information and a sample of Truline* Binder, research's gift to foundrymen.

HOW TRULINE BINDER INCREASES PRODUCTION IN MANY FOUNDRIES

SAVES TIME ON BAKING Truline Binder bakes through quickly—increasing core oven output. Time saving is sometimes as much as 30%.

SAVES TIME ON CLEANING Cores collapse quickly; this makes cleaning faster. Some foundries have cut cleaning time 50% with Truline Binder.

SAVES TIME ON RAMMING Flowability of Truline Binder mix speeds ramming, particularly in green sand facings.

*Reg. U. S. Pat. Off., by Hercules Powder Co.

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Reg. U. S. Pat. Off.

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HERCULES POWDER COMPANY

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JJ-38

LET'S GET TOGETHER AT THE FOUNDRY CONVENTION

THE ADVENTURES OF BILL

BY PAT DWYER **Drawings By RICHEY**

NEXT week," said Bill, "if my people do not spring 40 new jobs on me—and I would not put it past 'em—I am going to throw a few odds and ends in the old suit case, hop a rattler with a ticket marked New York in my pocket and spend about a week with the A. F. A. gang in the Pennsylvania hotel. Once upon a time I should scorn to waste my money on a railroad ticket, but I had no wife in those days. She insists on traveling on the cushions. So we kind of compromised and I learned to ride on the inside instead of on the rods. I probably will lose prestige in certain circles when and if the news leaks out. The soft and luxurious method of traveling may jeopardize my standing in local No. 1, Ancient, Free and Independent Side Door Pullman Association of North America, but it is altogether possible that I can rally enough votes among other back sliding and soft sitting members to prevent the secretary from handing me the black spot.

"Another factor in my favor is that the society is dwindling rapidly. Many of the old boys have quit the road and the trade and have taken up all kinds of odd jobs. I stopped at a railroad crossing one day recently to wait while a freight train about a mile long slowly rumbled past. Seems to me they are getting longer, heavier and faster all the time. The crossing tender recognized me. We had worked together in the Mesta one time years ago.

" 'This job ain't such a much,' he admitted, 'but it ain't so bad as jobs go these times and as they have been for the past 10 years. It is quiet and steady and to tell you the truth I ain't as curious as I used to be. I been everywhere and seen everything worth seeing all over the country. I ain't got no ambition to ride the rods no more, the side door Pullmans, the blind baggage or to dodge the dicks, but I get a bit of a kick outa standing here every day and watching the trains go by. The big compound locomotives whisk the passenger trains past in a few seconds, while similar but heavier puffing hog heads pull the long freights at almost the same speed. Did ya ever stop to figure it out that a train traveling 60 miles an hour is running at a rate of 88 feet per second? Every locomotive I see, whether standing still or roaring over the rails, vomiting smoke and sparks, a personification of limitless power and tireless energy, reminds me of the time I worked for Dave Hensell in the Philadelphia foundry of the Baldwin Locomotive Works, before the plant was moved to Eddystone. Boy, them was the days!'

"The caboose, or as they say on the other side, the van, clicked past

Here's where the boys roll their own

and I eased my car over the tracks. Perhaps if I go that way again I may hear the remainder of the Philadelphia story.

"Another reason, or rather a combination of two reasons that usually go together, for the reduced membership in the A. F. & I. S. D. P. A. of N. A.—almost as long as the titles of some of our mushroom or toadstool government bureaus—is the comparatively high death rate and the low birth rate all going out and none coming in. The old boy with the scythe and the hour glass is mowing 'em down right and left. I was grieved recently to learn of the death of a man with whom I was associated intimately over a period of many years. He was a young journeyman in the shop when I started to serve my apprenticeship—"

"Never mind starting on the apprentice memoirs," I interrupted at this point. "After so many years, fact and fiction form an alloy that cannot be separated into its component parts. Our old friend Mark Twain hit this human characteristic off very neatly one time when he said 'The older I get, the better I can remember things that never happened.' "

"Mark Twain, hey? Who was he? Did he ever carry a card? I knew a lad in Denver one time, red hair and long air cooled teeth, name of Mark Hooligan. Only a comparatively few people knew his real name. I learned it by accident one night in the Silver Dollar where a number of the boys were engaged in taking on a cargo of liquid ballast. The air is a little thin out in that mountain country and they did not want to float away until they were ready.

"One lad had just finished pouring a huge casting with the beer mugs arranged properly to show the position of the sprues—certainly, a three ladle job—the risers and the vents. This prompted Mark to tell of some iron making exploits in the olden time when his ancestors were kings in Ireland and lived on the main street right next to Tara's Hall. 'The O'Hooligans,' he modestly explained, 'owned a blast furnace, an ore mine, a limestone quarry and a battery of coke ovens and weren't beholden to nobody.' If any person present doubted the truth of the statement he would be glad to debate the subject to a conclusion with fists, rammers or shovels. 'The O'Hooligans,' he added, 'always were known as a peace loving people, and that was the reason they had been robbed and plundered by friend and enemy and reduced to the necessity of engaging in manual labor to prevent soul and body from parting company.' Just the same, so far as he,

(*Continued on page* 108)

From stock to dock!

When it comes to bottlenecks these days our experience proves that the shipping department is the place that takes a real beating. Pictures here show how stock can move quickly from storage to trucks without congestion.

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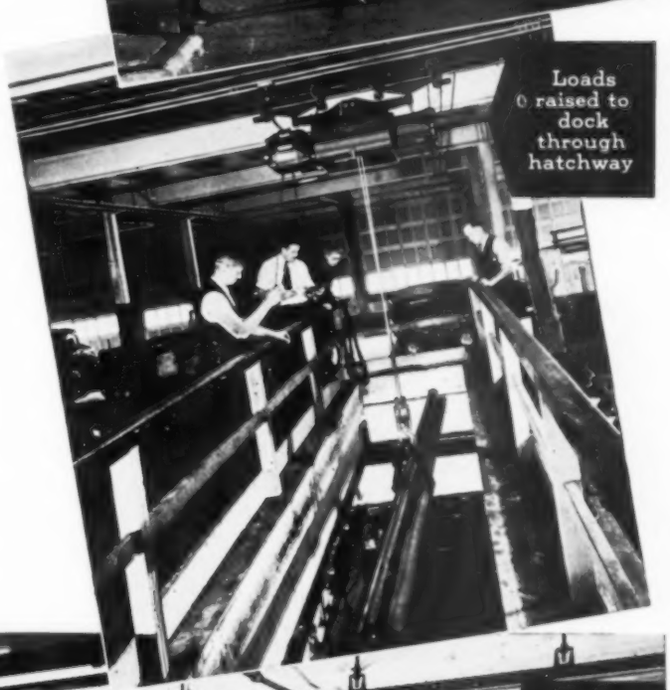
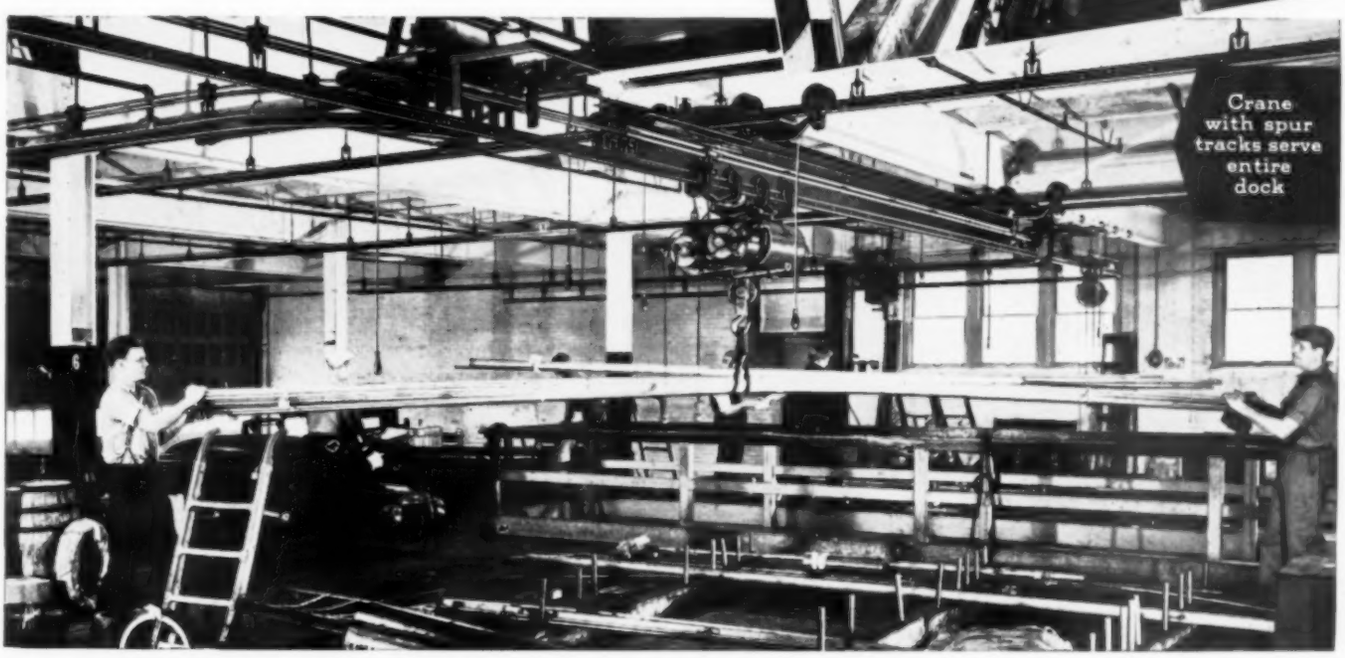
Overhead tracks allow access to stock



Loads raised to dock through hatchway



Crane with spur tracks serve entire dock

(*Continued from page* 106)

Mark Hooligan, the present speaker was concerned, he would like to see, yes sir, he would like to see any scut step, or even offer to step on the tail of his coat.

"His name may have been Mark, but all he ever got was Red, or the Snapper. Even this descriptive moniker usually was shortened down to Snap. The Red of course was inevitable. I never knew a hot top who was not called Red, irrespective of what name had been entered on the parish register, or in the vital statistics record. Derivation of the Snapper title was a little more complicated. It was based on the long, square edge and constantly exposed teeth, but had nothing to do with a snappy or snarleyow disposition. Some foundry wag, with the species of low cunning which distinguishes the tribe, noticed the manner in which our hero snapped at his food. Hence the happy inspiration.

"Talking about that Rocky Mountain country," Bill continued, "reminds me of a letter I had recently from an old friend of mine who went out there years ago and kind of settled down. He had read of some of the peculiar experiences of foundrymen as set down in THE FOUNDRY from time to time in recent years. Also of my suggestion that you collect a lot of the stuff and make a book out of it."

"Still harping on that idea. Well," I said, "I am a man of few words and the answer still is NO. At all times I shall be glad to receive contributions for my own private collection but shall not commit myself to any book promise. What other important items did your Rocky Mountain friend touch upon in this valued communication which duly came to hand and in which the contents were carefully noted?"

"The letter. Ah, yes, the letter. I have it here some place. It is not quite as thrilling as the story, the play or the picture of the same name, but on the other hand as you might say it is not filled with blood and corruption and that helps to strike a general balance. Some of the items may seem a trifle exaggerated, but they come within the bounds of probability as understood in the foundry where the virtues of charity, tolerance and broad mindedness are practiced to a remarkable degree. You believe my story and I'll believe your's and all that there kind of stuff.

"Here it is. A little soiled from carrying it around in my hip pocket with a paper of tobacco, but still fairly readable."

DEAR BILL: I been reading some of your adventures now and again when I ain't got nothing else to do. Why don't you tell some time about some of these here now shops where they don't give you nothing to work with and then growl if you don't hit the ball of their liking. I worked in one of these joints next door—of all places—to a planing mill half filled with dried lumber, shavings and saw dust. The combination was about as safe as a bird with an open torch in his hand prowling around a room filled with open powder kegs. Why the dump never caught fire is one of the inscrutable mysteries of divine providence.

Of course there is a reason for everything and the reason the foundry joined the planing mill was that power for driving the fan came from the planing mill shaft which extended into the foundry through a hole in the wall. The mill shut down at 5 o'clock every night and the power was shut off. If the heat was not finished at 5 o'clock, the foundry gang had to go into the mill and turn the fly wheel by hand. You often hear or read of sailors doing a heroic trick at the wheel in a raging storm. Child's play, my boy, just child's play. One session on the wheel was enough for me. I told the old man I was sea sick and quit.

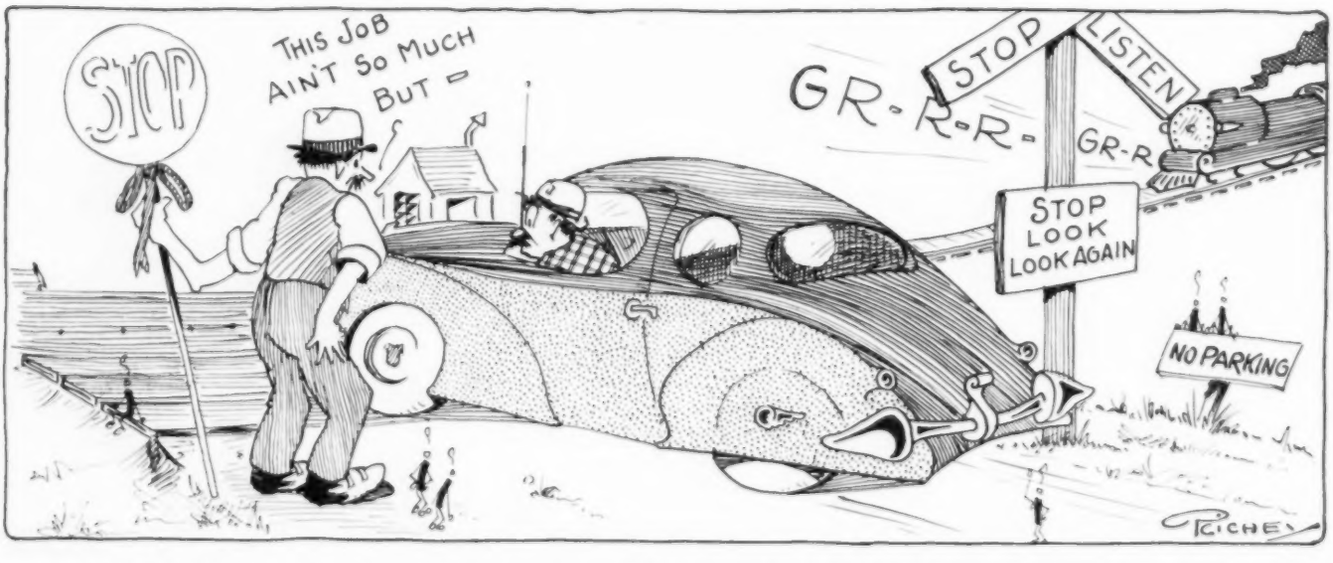
Gaggers were so scarce in this place that every man carried his day's supply stuck in his belt and in his hip pockets with the trowel and double ender and a modest supply of chewing tobacco. Loaded down with this mess of junk in the early part of the day always brought to mind the story of Dan'el, the famous jumping frog of Caleveras County after the guileless stranger had packed him full of buck shot. The load eventually gave 'em all hump backs and sprung their legs to the shape of a pair of calipers. If they wanted a few soldiers for a special job or to eke out the supply of gaggers they knocked hunks out of the wooden roof or side walls with their rammers, and split 'em up with a shovel.

When a lad needed a few nails for his gear teeth, a delicate pocket or for reinforcing the edges of the cope before drawing the pattern, he unraveled a piece of the crane cable after whacking it off with a hammer and chisel. When I left there, the cable was so short they had to put an *S*-hook on the bail of the crane ladle so that it might be lowered on to the horses in front of the cupola spout.

Every now and again the question comes up about how much scrap should be used in the cupola charge. Say, Bill, listen. We been making mining and milling machinery up and down the back bone of the Rocky Mountains for years and years and we ain't seen no pig iron for so long that if a hunk appeared we would think it was a wedge for a ball mill liner. We can get scrap in wide variety and at a reasonable price, but up around here pig iron is regarded as one of the precious metals. Old timers who refer to having seen piles of the stuff around blast furnaces and foundry yards in the East years ago are listened to with a proper degree of awe and reverence by the apprentice boys.

When it comes to improvising

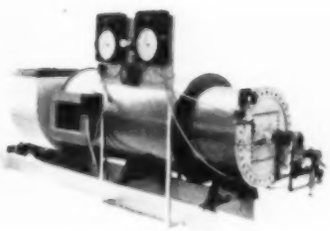
(*Concluded on page* 158)



Little Alice and the boy friend discuss gyps and jobs and sealing wax and whether iron pigs have wings

FOR DEFENSE WORK . . . .

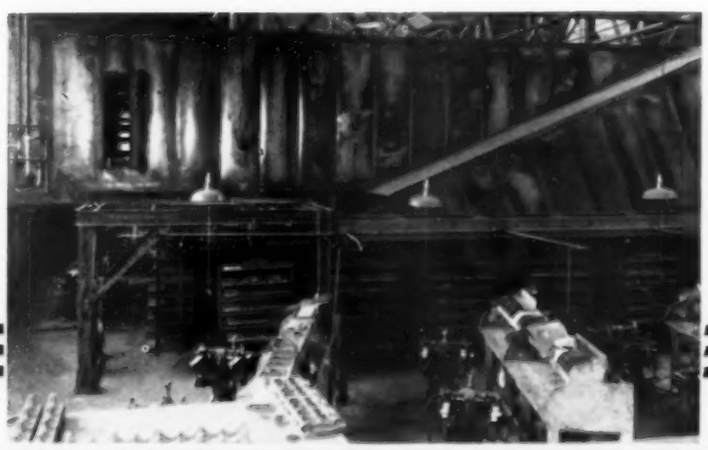
WHAT TYPE OVEN?



In no industry is the design and installation of the proper oven more important at the present time than in the foundry industry. The greater part of our capacity is given over to building ovens which are to be used either directly or indirectly in the development of our defense program.

A growing demand among foundries is for ovens for the exacting heat treating or "aging" of Magnesium Castings. Several such ovens have recently been ordered. First-hand knowledge of the requirements, and our experience of over thirty-five years, enables Young Brothers Engineers to consult and advise the proper oven design, with the correct heating method, and other necessary features.

Recent installations of Young Brothers Ovens range from drawer type ovens for the quick baking of smaller cores to those with a capacity to handle cars for heavy cores or molds. These ovens have been designed for a variety of heating methods such as coke, stoker-fired coal, oil, gas and electricity. Floor space has been saved in many instances by locating oil and gas heater units above the oven.



Whatever your production requirements, whatever fuel is most economical for you to use, Young Brothers Engineers are ready to serve you. There is one nearby. Call him!

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A·S·T·M

HOLDS INTERESTING MEETING

COMMITTEE week of the American Society for Testing Materials held in Washington on March 3 to 7, at the Mayflower hotel was market by more meetings of the society's technical committees than have been held in any previous year and by the registration of over 1000.

There was notable acceleration of the society's work in developing quality specifications for materials undoubtedly brought about in large part by national defense exigencies, but also responsible is the more streamlined action which recently has become in effect the society's standardization procedure.

Push Research Forward

A.S.T.M work has been of profound influence in connection with the production of materials and it is the feeling of many leaders in the society that one of its most effective contributions in the present emergency is to push forward both research and standardization activities as rapidly as possible.

An active meeting of committee A-3 on cast iron was held in which a thorough review was made of the activities of all the A-3 subcommittees. Government specifications had been classified previously and those which are of interest in the work of the committee have been referred to the appropriate subcommittee chairmen for review and suggestions. The committee on microstructure which has been working jointly with the American Foundrymen's Association committee is reporting a recommended method for classification of graphite in gray iron which committee A-3 is submitting to committee E-4 on metallography for review.

Dr. J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala., reported that subcommittee XV on impact testing had approved details of construction for a drop test machine and will report for publication a recommended practice for both types of impact test, one using a charpy test on a properly prepared broken transverse test bar and the other using a repeated drop test.

Subcommittee XI on methods of testing under the chairmanship of V. A. Crosby, Climax Molybdenum Co., Detroit, will act as a clearing committee on details of all new test methods which are brought forward from time to time by the various subcommittees. In line with this the committee reached agreement on standardized procedures for carrying out the following tests on cast iron: Compression, shear and torsion. These methods are to be covered in one document. One of the matters discussed at the meeting was the desirability of securing more widespread familiarity with standardized testing procedures and the committee will appreciate cooperation of any parties who wish to direct attention of foundries in U. S. and Canada to this work. One project which may be undertaken is possible joint action with the gray iron committee of the American Foundrymen's Association on developing talks by competent speakers on the subject of cast iron and the desirability of using standardized specifications and testing procedures, these talks to be given at various local meetings.

One of the important subjects discussed at the meeting of committee A-7 on malleable iron castings was the demand for quality specifications covering particular applications of the materials, and the subcommittee on cupola malleable iron was instructed to start formulation of suitable standard requirements covering malleable fittings.

The subgroup concerned with pearlitic and alloy malleable iron plans, in line with this same general subject, is to consider the possibility of separate standardized specifications covering the various types of this material as manufactured.

Correlate the Data

An editorial change in line with latest concepts of the properties of malleable iron was approved and referred to letter ballot of the committee by which the reference to yield point in the various standards will be changed to yield stress. There was discussion on information and data which are available on the creep resistance of malleable iron and the effect of small amounts of chromium on this material. An effort is to be made by the committee to have these data correlated and possibly offered for presentation at a meeting. The problem of galvanized embrittlement is one which is being studied and there is a possibility of a paper or report being developed within the next year.

One of the recommendations of subcommittee VIII on steel castings of committee A-1 on steel, headed by W. C. Hamilton, American Steel Foundries, was to adopt as standard the previously issued tentative specifications for carbon steel castings suitable for fusion welding for miscellaneous industrial uses (A 215-39 T). This subcommittee held a most interesting meeting with specially invited representatives from the Army, Navy and Federal Specifications Board to have a discussion on methods of cooperating along lines of simplification of specification requirements. Further steps are to be taken as a result of this meeting to effect a working arrangement.

Submit New Specifications

The subcommittee on copper-base alloys for sand castings of committee B-5 on copper and copper alloys under the chairmanship of G. H. Clamer, Ajax Metal Co., has completed seven new tentative specifiations for sand castings which will be companion standards to the specifications for copper alloy ingot (B 30-40 T) presented to the society last year. The proposed new specifications cover the following: Tin-bronze and leaded tin-bronze sand castings; high-leaded tin-bronze sand castings; leaded red brass and leaded semired brass sand castings; leaded yellow brass sand castings for general purposes; high-strength yellow brass and leaded high-strength yellow brass sand cast ings; aluminum-bronze sand castings, and leaded nickel-brass (leaded nickel-silver) and leaded nickel-bronze (leaded nickel-silver) sand castings.

Committee B-7 on light metals and alloys, cast and wrought gave intensive consideration to steps for overcoming a number of production problems which have arisen because of the great demand for various types of aluminum and magnesium alloys. One of the production bottlenecks in connection with aluminum sand castings has been the time involved and the equipment necessary for heat treating certain type castings to produce high strength. A recent development in this field is a new aluminum alloy which has high-strength properties in the as-cast condition, thus eliminating the heat treating requirements. Fortunate-

(*Concluded on page* 112)

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(*Concluded from page* 110)

ly, this new alloy can be cast easily and with its high strength combines good corrosion resistance.

In connection with magnesium alloys in all forms the committee is proposing new high purity grades. These offer greater resistance to salt water corrosion than the normal grades. Except for this, the alloys apparently have no better properties than the normal grades. Obviously, the high purity alloys are available from limited sources of supply and at premium prices. In connection with anodic oxidation treatment of aluminum and aluminum alloys for added corrosion protection and abrasion resistance the committee is beginning a program of tests. Samples of various alloys have been treated by different methods and will be tested by various co-operating laboratories.

Speeds of Mold Conveyors Are Co-Ordinated in Ford Foundry

By OSCAR PFEFFER

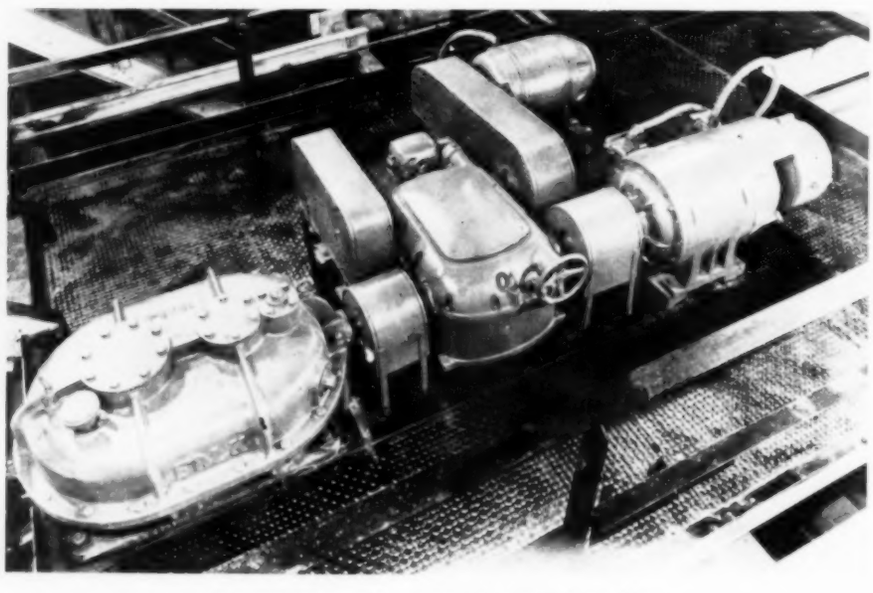
A NEW method of matching mold turntable speeds with production quantity requirements, which includes the application of varipitch speed changers manufactured by the Allis-Chalmers Mfg. Co., Milwaukee, recently was placed in operation by the Ford Motor Co. According to the Ford foundry engineers, the new arrangement solves a speed control problem which has been troublesome in many high production foundries.

The molds are produced in cope and drag metal flasks 17½ x 21 x 12 inches and 25 x 21 x 9 inches. Production reel conveyors carry these sand molds from the molding stations past the metal casting furnaces where the molds are poured off. While they cool, the molds are carried along still further to the shakeout station where the steel castings are removed and the flasks shaken out.

In the Ford foundry set-up, a pilot room is provided for one or more conveyors. A standard high-speed motor is connected by V-belt drive to the speed changer input shaft. One side of the speed changer output shaft is direct connected to a large gear reducer to provide the slow speeds needed to run the conveyor. The other side of the speed changer output shaft is connected to a synchronizing generator motor that supplies power to run another conveyor at an automatically synchronized speed. Advantages of this arrangement are that standard high-speed motors may be used.

The conveyors are synchronized with *fast* and *slow* controls located at the shakeout station. Emergency stops are located at the mold pour-out station and at the molding line. A magnetic brake is used, not to stop the conveyor in case of emergency, but to keep the slack equal on the reel conveyor chain when at rest, eliminating the possibility of conveyor backcoasting, and to keep the synchronizing motor in step.

The Ford foundry now has eight of these speed changer units in operation. Four of these units are used with 10-horsepower high-speed motors; two are used with 3-horsepower motors; and two with 1½ horsepower motors.



Arrangement solves speed control problem

Book Review

Proceedings of the Forty-Third Annual Meeting, Vol. 40, 1940, cloth, 1396 pages, 6 x 9 inches, published by the American Society for Testing Materials, 260 South Broad street, Philadelphia, and available to members for $6.00 and to non-members for $9.00.

This volume of almost 1400 pages comprises a detailed report of the forty-third annual meeting of the American Society for Testing Materials. The first 58 pages of the book comprise a summary of the proceedings of the meeting, the annual address of its president, H. H. Morgan, and the annual report of the executive committee. Detailed reports of some 60 standing committees of the society follow, and occupy some 404 pages. Nearly 110 pages, comprising 4 separate papers, are devoted to "A Symposium on Significance of the Tension Test of Metals in Relation to Design," including the discussion. Papers relating to metals occupy about 378 pages, while 166 pages are devoted to cement, concrete, etc. Papers on miscellaneous subjects cover about 150 pages, and a "Symposium on Problems in Classification of Natural Water Intended for Industrial Use," occupies about 50 pages. In addition the volume contains the fifteenth Edgar Marburg lecture entitled, "Portland Cement" by P. H. Bates. Extensive subject and author indexes conclude the volume.

First Lecture Held

Approximately fifty designers, users and producers of castings attended the first lecture of the Spring educational course held by the Metropolitan Chapter of the A. F. A. on March 12 at the Essex County Boy's Vocational School, Newark, N. J. Sam Tour, Lucius Pitkin Inc., New York, the speaker of the evening, ably discussed various classifications of copper alloy castings and pointed out the necessary precautions that must be taken for each type to obtain optimum results. Recommended practice in producing copper base castings is to heat to the necessary temperatures rapidly as possible, dioxidize, and pour immediately.

Educational Chairman N. E. Woldman, Eclipse Aviation Corp., Bendix, N. J. announced that lectures on light alloy castings, ferrous castings and forgings versus castings versus welded sections would follow in the order named on the successive Wednesday evenings.

Milwaukee Foundry Equipment Co., Milwaukee, has let general contract for construction of a one-story plant addition 30 x 129 feet.

Activities of FOUNDRY GROUPS

Wisconsin

WISCONSIN Chapter held its regular monthly meeting at the Schroeder hotel, Milwaukee, March 21, with 194 members and guests present. B. D. Claffey, General Malleable Corp., and president of the chapter presided.

This meeting was of major importance for finally after three attempts the Wisconsin Chapter vaulted into the lead of the membership contest by adding to their list of 39 members, 25 more to make a total of 64 as to the date of Feb. 28, forcing the Chesapeake Chapter to relinquish its grip on the membership trophy. President Claffey introduced E. O. Jones, director of the safety and hygiene section of the A. F. A. who after congratulating the chapter turned the meeting over to William Hambley, chairman of the membership committee. Mr. Hambley introduced several new members that were present, at the same time served notice to all that the membership trophy was going to remain in the possession of the Wisconsin Chapter. Another welcome guest, R. E. Kennedy, secretary of the association, was presented to the chapter. He also congratulated the chapter and the membership chairman. Before President Claffey adjourned the meeting, congratulatory telegrams were read from the Chesapeake chairman, E. W. Horlebein, and national vice president, H. S. Simpson. After adjournment the chapter divided into four group sessions.

The steel session under the chairmanship of D. C. Zuege, Sivyer Steel Casting Co., had for its discussion leader James J. Ewens, superintendent, Milwaukee Steel Foundry Co.., who spoke on the subject, "Controlling Production." Mr. Ewens outlined the methods by which it is possible to plan for production of castings both in the core room and in the foundry. After castings have been made a systematic procedure is followed to assure delivery of castings to various finishing operations in the cleaning room. The discussion which followed Mr. Ewens' presentation, was very interesting.

In the gray iron session under the chairmanship of Harry E. Ladwig, Allis-Chalmers Mfg. Co., T. Swanson, also of the Allis-Chalmers company had for his subject, "Machine Design as it Affects Castings." Mr. Swanson stressed the need of co-operation between the foundry and the engineering department. Through such co-operation, many foundry problems may be overcome before the castings actually go into production. The type of material used for such castings is left entirely to the foundry, the engineering department specifies only physical requirements.

In the malleable session D. I. Dobson, General Malleable Co., Waukesha, Wis., presided and A. C. Erlandson of the same company acted as discussion leader. "Sand Control" was the chief topic. Mr. Erlandson stated that they were using four standard facings in their foundry, stressing very strongly the effect of grain size in their facings and that 60 to 70 per cent of their facing sands were found on three consecutive screens. The use of synthetic sands in jobbing production work with good laboratory control is essential in producing good castings.

The nonferrous group, Roy Jacobs, Standard Brass Co., chairman, had for its discussion leader H. L. Smith, chief metallurgist, Federated Metals division, American Smelting & Refining Co., Whiting, Ind. His topic was, "Bronzes and Their Alloys". Mr. Smith discussed the importance of correct melting procedure oxidizing and reducing gases in metal. Slides were shown of the production of ingots by his company.—*H. C. Waldron, secretary.*

B. D. Claffey and W. Hambley with bell received by Wisconsin Chapter for topping membership drive for February. Photo by John Bing, A. P. Green Fire Brick Co., Milwaukee

Cincinnati

BRASS foundry practice was the subject of discussion at the regular meeting of the Cincinnati District Chapter held at Shuller's

ADVERTISING PAGES OMITTED

restaurant, April 8. William Romanoff, technical superintendent, H. Kramer & Co., Chicago, was the speaker. Approximately 45 members attended the meeting and H. F. McFarlin, chairman of the chapter and Charles Hilb, officer of the day, presided.

Mr. Romanoff's broad experience, both in operating a foundry and in consulting work, formed the basis of an interesting presentation of various phases of nonferrous foundry practice. Mr. Romanoff first discussed conservation of metals by reducing foundry losses; and considered next the effects on brass castings of various alloys and impurities. Other topics taken up were equilibrium diagram for copper-lead alloys, also phosphor, manganese and aluminum bronzes. Questions and answers interspersed the several topics.

Elmer J. Carmody, foundry engineer, Charles C. Kawin Co., Chicago, will be the principal speaker at the May 20 meeting of the chapter, to be held at Shuller's restaurant. His subject will be, "Heading and Gating."—*Henry M. Wood, secretary.*

Birmingham

BIRMINGHAM District Chapter held its regular monthly meeting March 21 at the Tutwiler hotel. Lester N. Shannon, national A.F.A. president, told the chapter that the forty-fifth annual convention was designed to be the best ever held. Mr. Shannon gave an enthusiastic report of the chapters in the East and Midwest where he recently had visited. He stated that he expected to have 5000 A.F.A. members at the close of the year.

The speaker for the meeting was R. G. McElwee, Vanadium Corp. of America, Detroit. Mr. McElwee gave an interesting talk on "Alloying and Processing of Iron." He was specific in giving many details accompanied by slides showing the effects of various alloys. The foundrymen were warned that they should learn to use available alloys for their work wherever possible since there is likely to be a shortage in time. After Mr. McElwee had concluded his talk, he was asked many questions regarding alloys and their behavior on iron.—*D. L. Booker, secretary-treasurer.*

Metropolitan

THE best attended meeting of the year for the Metropolitan chapter was justified by the brilliant speakers of the evening. The meeting was held at the Essex House, Newark, N. J. on April 9 and J. W. Reid, vice chairman of the chapter presided. A. S. Laytham, W. P. Laytham & Sons Co. of Paterson, N. J. showed colored moving pictures of sword fishing off Nantucket island. They were especially delightful and inspiring to the amateur fishermen throughout the audience.

Vinton Higbie, president and general manager, Atlantic Castings & Engineering Corp., Clifton, N. J., was introduced by W. A. Phair, secretary of the chapter and he described the new Capaco plaster process for producing castings. Tolerances of 0.005 inches are common for aluminum, brass, manganese bronze and aluminum bronze castings made by this patented process. Intricate designs having attractive finishes are being made which require no machining other than the cutting and grinding the gates during cleaning.

The molds are a plaster—asbestos-water mixture with a suitable agent to provide setting of the mold in a few minutes. The mold is then dried in about one hour in a continuous oven. The hardened or air dried cope or drag of the mold weighs about 16 pounds which after oven drying weighs about 6 pounds. Complete dryness of the mold is essential to the process which provides high permeability and produces no steam in the mold when pouring the metal. The mold measures 12 x 18 x 35 inches and cools the metal in about 3 hours. This annealing process prevents distortion of the casting.

Strengths of the same order as in regular sand casting practice are secured for the brasses and bronzes. However, some aluminum alloys drop slightly in strength compared with sand cast aluminum.

Unusual density is secured principally because of the high permeability of the mold. Although the process is confined at this time to small castings and to pouring temperatures below 2400 degrees Fahr., developments are under way to enlarge the scope of the process.

Unusual interest was displayed in Mr. Higbie's talk by the many questions asked and the many persons who remained to examine the display which had been prepared.

Previous to the talk Tom J. Wood, American Brake Shoe and Foundry Co., Mahwah, N. J., chairman of the nominating committee, presented the slate of nominees for the coming year. Henry Seidel, Penn-Rillton Co., New York, spoke briefly about the coming A. F. A. convention in New York and announced the sale of banquet tickets of the convention.—*Fred G. Sefing.*

Slate of officers nominated for the coming year is as follows: Dr. N. E. Woldman, Eclipse Aviation Corp., Bendix, N. J., chairman; Fred G. Sefing, International Nickel Co. Inc., New York, vice chairman; K. A. DeLonge, International Nickel Co. Inc., New York, secretary, and T. D. Parker, Climax

(*Continued on page* 121)

Birmingham Chapter's apprentice course lectures were well attended

(*Continued from page* 118)
Molybdenum Co., New York treasurer.

Proposed for the directorate with terms expiring in 1942 are: K. V. Wheeler, American Steel Castings Co., Newark, N. J.; H. G. Lamker, Wright Aeronautical Corp., Paterson, N. J.; D. Polderman Jr., Whiting Corp., New York, and A. C. Leverton, Fisher Foundry division, Oil Less Bearing Co., Bound Brook, N. J.

The following are nominated for terms expiring in 1943: H. A. Deane, American Brake Shoe & Foundry Co., Mahwah, N. J.; R. E. Nesbitt, Pratt Institute, Brooklyn; Walter O. Moyer, Otis Elevator Co., Yonkers, N. Y.; D. E. Broggi, Neptune Meter Co., Long Island City, N. Y., and Wayne Martin, General Bronze Co., Long Island City, N. Y.—*Ben Price.*

N. California

PRECEDING the March 14 meeting of the Northern California Chapter held at the Lake Merritt hotel, the directors met to give consideration and take action on several subjects. A sturdy though modest increase in membership was reported, and it was stated that the present members retain their interest, which is of great importance. As delegates to the chapter chairmen's conference during the A.F.A. annual convention, the chairman, Ivan L. Johnson, and vice chairman, E. M. Welch, were elected to attend. The directors adjourned to the chapter dinner meeting where 54 members and guests were present. There was much speculation as to why the secretary absented himself from the meeting, since it was only the second time since Nov. 15, 1935, that he has neglected his duties.

Chairman Johnson presided, and introduced C. C. Kawin, well known to all through his business life. The coffee talker, Anton Sluis, a native of Holland, gave a fascinating account of experiences on a recent visit to his native land where he was for a time before, during and after the invasion. Being a citizen of the United States, he was privileged to return. Dr. C. D. D'Amico, formerly of the University of Michigan, now metallurgist with Standard Oil of California, and a recent member of the chapter, gave a technical talk on the "Solidification Characteristics of Cast Iron." Several new members and visitors were introduced before Jim Francis, chairman of the program committee, outlined the meetings for April and May, which will be the last preceding the annual meeting in June.—*George L. Kennard, secretary.*

Twin City

MARCH meeting of the Twin City Foundrymen's Association was held March 17, at the North Central Commercial club in St. Paul. The meeting followed closely on a severe blizzard, and as a result the attendance was less than usual. E. C. Madson, vice president of the association, presided in the absence of Fred Kaim, president. The proposition of changing the local association to a chapter of the A.F.A. was discussed. The secretary reported that a poll was being taken of all the members and the present returns were favorable. All those present expressed themselves, but definite action was postponed until all members had voted.

Speaker of the evening was Andrew Boss, professor emeritus, Agriculture Experiment Station, University of Minnesota who talked on the subject, "Living in a Power and Machine Age." The lecture was illustrated by charts. Professor Boss traced the progress of civilization from the beginning to the present time and pointed out the effect of the introduction of power machinery on our civilization and on the individual. It was a most interesting evening and the foundrymen seemed to enjoy a subject which was not shop for one evening.—*W. O. Potter, secretary-treasurer.*

S. California

APPROXIMATELY 100 members and guests of the Southern California Chapter attended the March 27 meeting held at the Elks club, Los Angeles, to hear A. W. Gregg, Whiting Corp., Harvey, Ill., discuss "Cupola Operation and Mechanical Charging." James Eppley, president of the chapter, presided.

Mr. Gregg gave an interesting talk on general cupola practice and led a lively discussion which was profitable to all. He also showed slides on mechanical charging that brought out many questions. The entertainment committee presented a fine technicolor picture, "Beautiful Hawaii" which was shown through the courtesy of Matson Navigation Co. Mr. Bailey, chairman of the membership committee reported six new members since last meeting, making a total of about 39 since the start of the business year.

Robert Gregg, chairman of the Pacific Coast regional meeting which is to be held in conjunction with the Western Metal congress May 19 to 23, announced that Foundry Day will be Friday, May 23, with sessions also to be held Thursday morning, May 22. Foundrymen from the entire coast are expected to attend and hear the fine speakers, and to join in the general metal congress sessions. Mr. Eppley announced the nominating committee to select candidates for officers and the board for the coming year as follows: Pasquale Arpea, chairman, William Emmett, R. G. Crichton, A. G. Zima, A. M. Barker.

"Synthetic Sands and Available California Sands" is to be the subject for discussion at the May 1 meeting of the chapter.—*W. F. Haggman, secretary.*

Pittsburgh

WHAT sand does when actually in foundry service was shown to the Pittsburgh Foundrymen's Association at the regular March meeting held at Pittsburgh Athletic Association, March 17. Principal speaker was Earl E. Woodliff, Harry W. Dietert Co., Detroit, who illustrated by means of a dilatometer furnace what happens to various kinds of sand mixes under actual operating conditions. From a window in the furnace, which was kept at 2400 degrees Fahr., an image of the sand was thrown on a screen. Disintegration and change in character of the sand was clearly shown, and by varying the contents of the sand samples, which were rammed into a test mold and thus prepared in conditions similar to those actually encountered in the foundry, effects of the various components were demonstrated.

Mr. Woodliff traced defects in castings to the sand, showed what factors in the sand were causing these defects. He also paid particular attention to the hot strength of the sand, which often is not a function of its green sand strength. Physical characteristics of a good sand which produce high hot strength include its purity and the per cent of its silica content. He demonstrated that effects of washes and coatings were not enough to make a poor sand have good refractory qualities. Two other factors have important bearing on the hot strength of the mix—the percentage of silica flour used and the grade of fire clay. High quality fire clay must be used to give as high a sintering point as possible, while no more than 5 per cent silica flour should be included. Potency of silica flour is not generally recognized; amounts in excess of 5 per cent give unnecessary degrees of hardness.

Prior to Mr. Woodliff's talk, a sound-color movie was presented. Prepared by Modern Equipment Co., Port Washington, Wis., the picture showed up-to-date installations of

(*Continued on page* 124)

HERE'S THE MODERN WAY

Greater Production and Lower Costs

DO you want greater production without expanding your foundry? Do you want lower costs? Are you interested in promoting safety? Then you should investigate Cleveland Tramrail.

Because the most important item affecting costs and output in a foundry is materials handling, Cleveland Tramrail overhead materials handling equipment has become an outstanding factor in foundry modernization.

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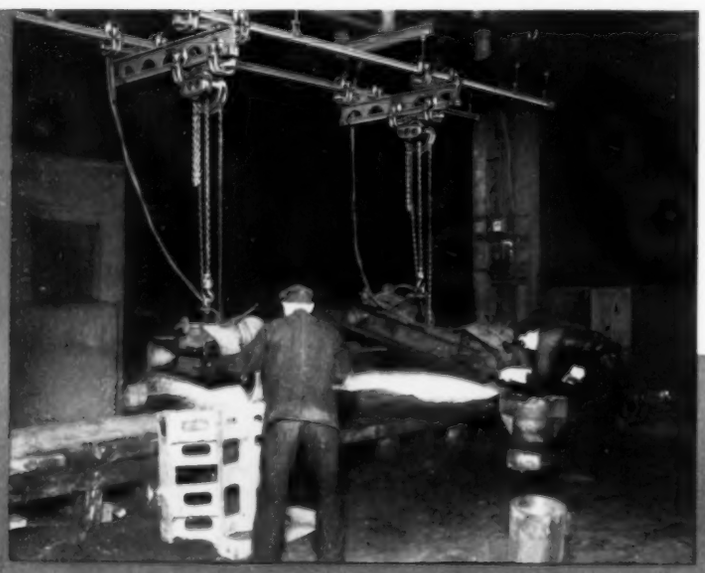
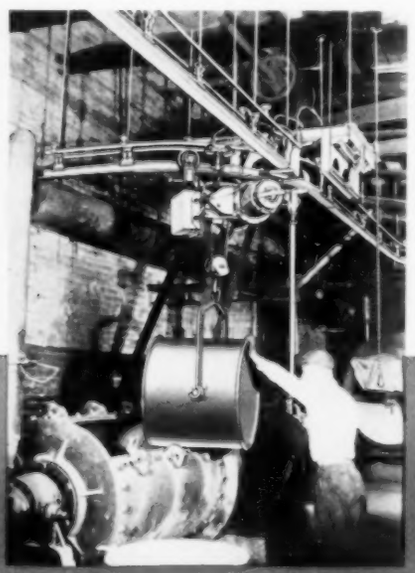
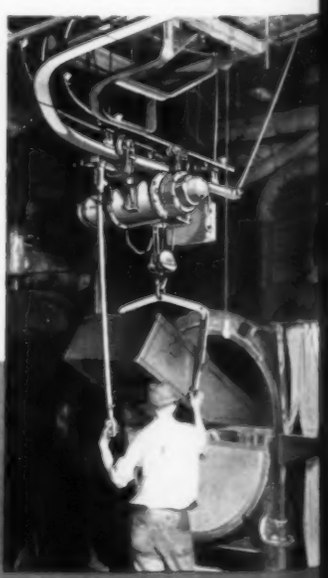


Short-span cranes from which swing grinders are suspended eliminate fatigue and speed up production.



A rigid arm push-button controlled hand-propelled carrier with electric hoist, serving tumbler barrels, enables one man to handle loads.



Tote box loads are transport[illegible] from shakeout and charged into the [illegible] without rehandlin[illegible]

Metal from cupola can be conveniently weighed by an overhead track scale built into a Cleveland Tramrail system.

Hand-propelled crane and carrier with electric hoist. Push-button control in ladle shankhandle permits hoisting and lowering of the ladle while at the same time retaining control of the ladle for pouring.

Hand-propelled carrier with electric hoist. A rigid arm is used to propel the carrier along the runway. In the lower end of the arm is located the push button control.

A long span three-runway crane provides complete coverage of this foundry floor for setting up molds and pouring. The crane is pushed to cupola for filling ladles.

Core sand distribution by a cab-controlled carrier and hoist with a drop-bottom bucket.

Handling hot metal direct from cupola to continuous molding loop. Motor-tilting bull ladle on motor-driven, platform-controlled carrier. Also hand-tilting cylindrical ladle on hand-propelled carrier with electric hoist.

CLEVELAND TRAMRAIL

(*Continued from page* 121)

materials handling and pouring equipment in foundries from nonferrous to steel.

Since there remain only two regular meetings, the nominating committee was announced at the meeting, to report in April the names of proposed officers for the coming year which will be voted upon in May. Nominating committee consists of J. H. Johnston, Westinghouse Electric & Mfg. Co.; J. H. McCrady, James H. McCrady Sand Co.; and W. C. Buske, McConway & Torley Corp.—*R. L. Hartford.*

Western N.Y.

REGULAR monthly meeting of the Western New York Chapter on March 7 developed the largest attendance of any regular business session held thus far. Following the showing of the automotive industry's newest film, "Singing Wheels," W. W. Rose, executive vice president, Gray Iron Founders' Society, gave a brief picture in words of the defense situation as it relates to cast metal products, as well as an insight into the scrap rail situation which confronts a large portion of the industry. C. E. Hoyt, executive vice president of the A.F.A., talked to the group informally on various phases of chapter activity, the membership drive as well as the coming national convention in New York. Following Mr. Hoyt's remarks, H. S. Simpson, president of the National Engineering Co., Chicago, and vice president of the association, presented his constructive views on, "The Marketing of Cast Metal Products." From the discussion and comment which followed, it is evident that this is a large subject upon which all too few casting makers agree. The subject proved to be one for more study and consideration, and those present agreed with Mr. Simpson that it could profitably be the subject for chapter meetings at recurring intervals. The chapter members' reception to such an interesting program was most enthusiastic since it is not often any chapter is privileged to have so many headliners with them at one time.

Regular monthly meeting of the Western New York Chapter, A. F. A. was held at the Touraine hotel, Buffalo, April 4. Those present viewed a most interesting film supplied by DuPont on synthetic rubber. Everyone carried away a most impressive mental picture of what science is doing to make us self-sustaining in the face of difficult world conditions.

The vice chairman of the chapter, Robert K. Glass, gave a more than interesting talk on "Heat Treatment." With pictures, slides and explanatory comment, Mr. Glass discussed the entire process. He was kept on his feet for 1 hour and 50 minutes answering questions from those who would have hesitated to discuss such involved subjects if his splendid talk had not been kept within the scope of practical foundrymen. Metallurgists and metal magicians may have missed a few high sounding phrases, but the foundrymen didn't miss a word.

The May 2 meeting will be held as usual at the Touraine hotel, Buffalo, with dinner at 6:30 and speaker at 8 p. m. William J. Picard, chairman of the board of standards and appeals of New York state will discuss, "The Friendliness of Constructive Contact Between the State and Industry."—*Eliot Armstrong, secretary.*

N.Ill.-S.Wis.

REGULAR monthly meeting of the Northern Illinois-Southern Wisconsin Chapter was held April 8 at Hotel Freeport, Freeport, Ill. Attendance was 48, Chairman P. A. Paulson presided. C. B. Teeter, Refractory Mica Products Co., spoke on "Core and Mold Washes." He described the preparation of the mica from the time it is mined until it is used in the foundry or core room. He also described some of the less obvious uses of mica flakes in both ferrous and nonferrous foundry practice.

(*Continued on page* 126)

A large group attended the noon luncheon held Feb. 21 at the Wisconsin regional

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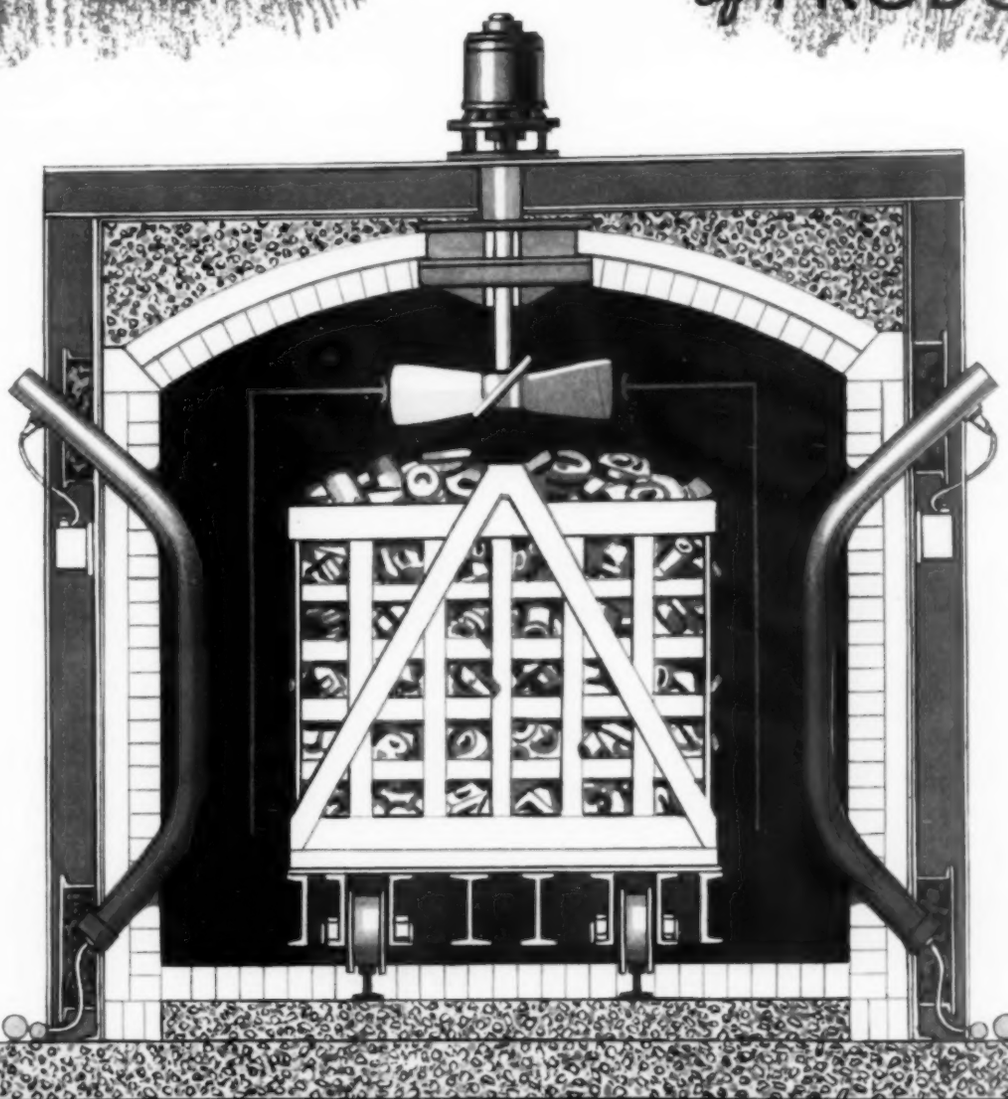

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(*Continued from page* 124)

Chairman Paulson appointed a committee to plan the chapter's annual outing which will be held June 7 at Svithiod park, just south of Rockford, Ill. The nominating committee reported its recommendations for chapter officers for the coming year. Election will be held at the May meeting which will be at Hotel Hilton, Beloit, Wis., on May 20. The speaker will be W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee, who will talk on, "Gray Iron Foundry Defects."

Attendance was approximately 47 at the regular meeting of the chapter held March 11 at Hotel Faust, Rockford, Ill. Meeting was presided over by P. A. Paulson chairman. Fred G. Sefing, International Nickel Co., New York, was the speaker—his subject, "The Influence of the Condition of the Molten Metal on the Soundness and Properties of Castings." Mr. Sefing is a good speaker and talks the language of the everyday foundryman; and many of his suggestions could be put to immediate use.—*J. R. Cochran, technical secretary.*

Ontario

APPROXIMATELY 90 were present at the Feb. 28 meeting of the Ontario Chapter at Rock Garden Lodge, Hamilton, Ont., to hear E. K. Smith, Electro Metallurgical Co., discuss alloy additions to gray iron, malleable iron and steel castings. Chairman D. M. Storie, Fittings Ltd., Oshawa, Ont., presided. Report of the membership committee presented by D. J. Macdonald, Standard Sanitary & Dominion Radiator Ltd., Toronto, showed four new members for the chapter since the January meeting.

Prior to the main address of the evening, Chairman Storie introduced Howard Biers, Canadian representative of the Electro Metallurgical Co., who had recently returned from Great Britain. Speaking briefly, Mr. Biers indicated that the foundry industry there had suffered almost negligible damage from air raids. The two cases of bombing in foundry and steel plants with which he had come in contact were rather amusing instances. In one case a high explosive bomb fell into a large ladle and blew the roof off the plant without doing other damage. In the second incendiary bombs dropped in a rolling mill failed to halt production even momentarily; the mill superintendent refusing to stop the machinery to have them removed.

In introducing his talk on "Alloy Additions in Gray Iron, Malleable Iron and Steel Castings," E. K. Smith made reference to the excellent papers on the subject which had been presented before the Ontario Chapter. Mr. Smith stated that while it is nice for the foundry to be able to add alloys in the cupola, there are many alloys that can be added in part or altogether to advantage in the ladle. In recent years it has been demonstrated that greater percentages of certain alloys can be added in the ladle than formerly was thought possible. In respect to the addition of alloys in the cupola, it has been shown clearly that the attempt to run alloy iron in the middle of the operating day invariably results in dilution effects. For instance, when copper was added in the cupola in one experiment, it was found in no less than fourteen charges and never reached the percentage that was desired.

The efficient utilization of alloy additions depends not only upon the properties desired but also upon the type of operation to be carried out by the plant. For instance, one foundry making a high strength cast iron by using plenty of steel scrap may not require alloy additions. But on the other hand, alloys may be the only reasonable solution to the problem of a plant making stove plate which for some reason required a limited amount of high strength iron.

An interesting point in alloy additions is the use of chromium for improving impact resistance. It acts to improve the structure of an iron up to the point where carbides appear. If the iron is soft, it

(*Continued on page* 129)

One of the features of the Wisconsin regional was the dinner held on the evening of Feb. 20

(*Continued from page* 126)

may be possible to add quite a considerable percentage of chromium before carbides begin to appear in the structure, but in harder iron, the percentage which may be used will be considerably lower.

There are times when alloys may be used to exceptional advantage to cure casting troubles. Using a certain iron, difficulties were encountered with cracks in fairly heavy castings which on examination, indicated a weak, extremely dendritic structure at the bottom of the crack. Simply by adding 0.20 per cent silicon, the structure of the metal was changed, and the trouble cured. Another instance was a casting with several widely varied sections in which the fine grain was required in the heavy section and the light section had to be machined. With the metal being used, a brinell of 207 was developed in the heavier section, and a brinell of 419 on the light section which required machining. By addition of 1 per cent silicon a ½ per cent chromium, the brinell of the light section was reduced to 255, and that of the heavy section increased to 228.

An interesting type of service for cast iron is in brake drums for trucks, which become hot in heavy service and tend to develop heat checks. Good service is given with application by nickel-chrome-molybdenum iron. Metallographic examinations of this type of iron after eventual failure show the crack running from one flake of graphite to another. It would seem to indicate that the development of a more nodular graphitic structure in this type of iron would result in greatly improved service.

For many years there were practically no changes in malleable iron, but recently some important developments have taken place, and many types of structure and composition are now being employed. By reducing the percentage of ferrite in malleable iron, it is possible to increase the strength while raising the hardness. One automobile manufacturer now is using a pearlitic malleable for crankshafts. Pearlitic malleable may be developed in a number of ways, including changes in compositions, variation in firing of the malleable furnace, by heat treatment, by the use of a short anneal, and by use of alloys. Chromium, molybdenum and vanadium tend to hinder the anneal, and thus aid in producing a pearlitic structure. Alloy additions also play an important part in the production of modern steel to meet a wide variety of casting requirements.—*G. L. White, secretary-treasurer.*

New England

ABOUT 60 members and guests were present at the regular meeting of the New England Foundrymen's Association which was held at the Engineers' Club, Boston, March 12. Charles O. Butler, president of the association, introduced William B. George, foundry engineer, R. Lavin & Sons Inc., Chicago, who discussed, "Gating and Risering of Nonferrous Castings."

Mr. George, who confined his remarks entirely to nonferrous castings, stated that in order to bring about directional solidification it is necessary to have a properly designed riser which will contain an ample supply of hot metal until the casting approaches the solidification stage. To accomplish this, risers should be sufficiently larger than the section which they feed to stay open for the required time of feeding. They should not be placed on the mold on the side opposite a gate, but rather the gate should run into the riser or enter the casting adjacent to it. Blind risers are preferred to open ones as more likely to stay hot longer. Top pouring is preferred to bottom pouring. The speaker recommended round risers in preference to square or rectangular ones. Shrink bobs also are advisable.

Absorption of gases by the metal becomes an important factor when the composition requires a melting temperature over 2200 degrees Fahr. Such metals should be melted and poured rapidly to keep down gas content. Since it is not the pouring temperature, but the maximum temperature to which the metal has been raised during the melt causes trouble. Metal can be oxidized in that manner, but not burned. As a remedy, addition of zinc just before pouring can result in good castings even when the metal has been raised to an abnormally high temperature during the melt. Best temperature for pouring test bars is 2150 degrees Fahr. for common alloys such as

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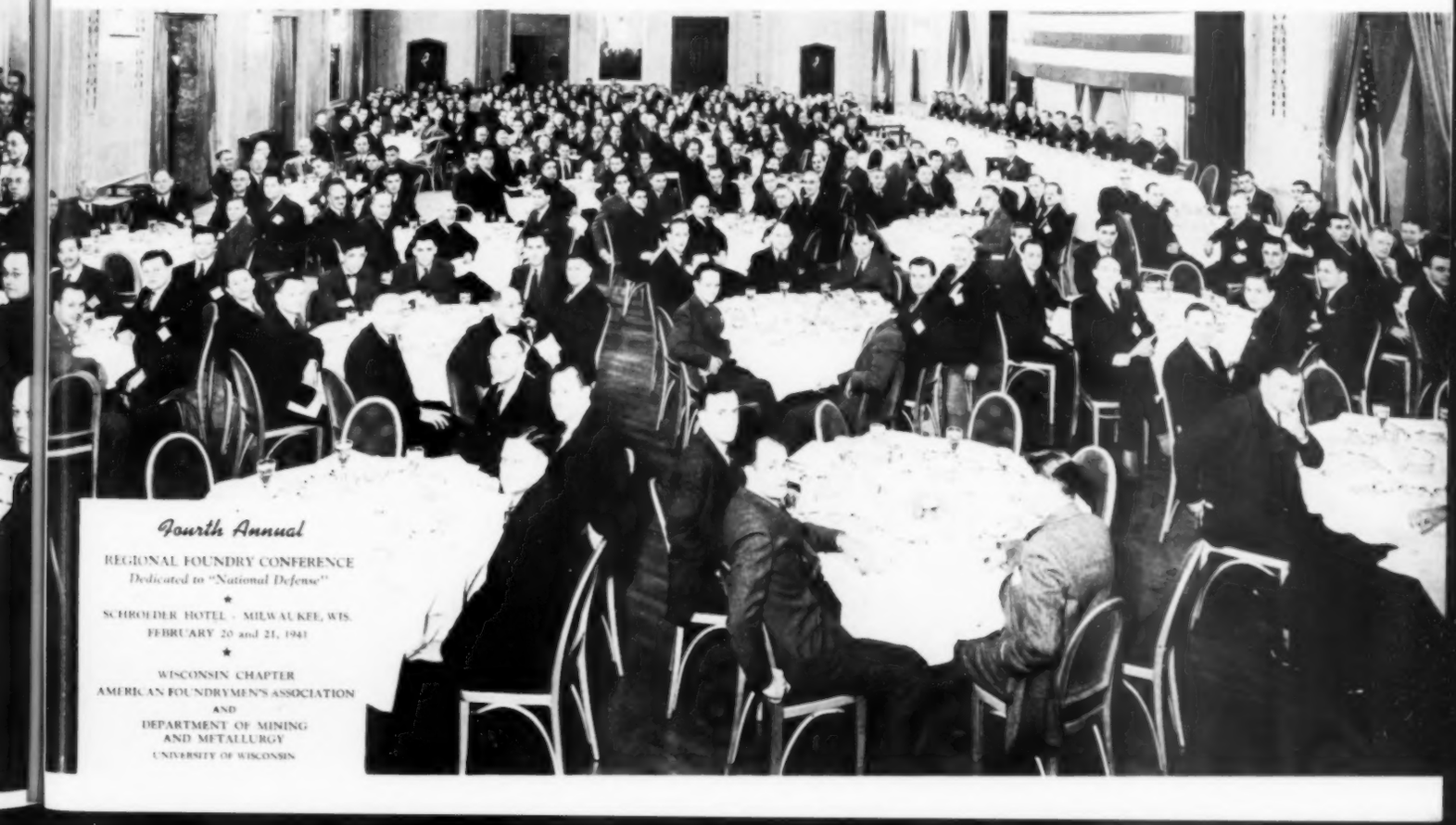
Luncheon group on the opening day, Feb. 20, of the Wisconsin regional meeting



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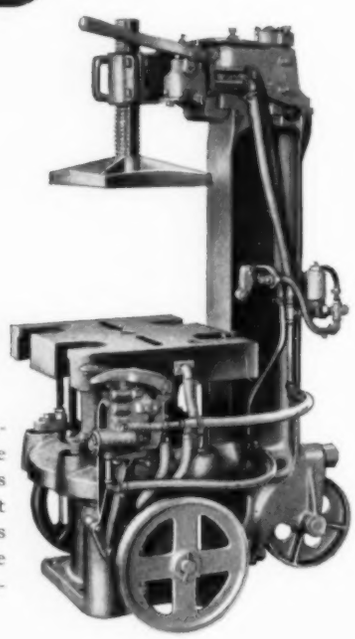

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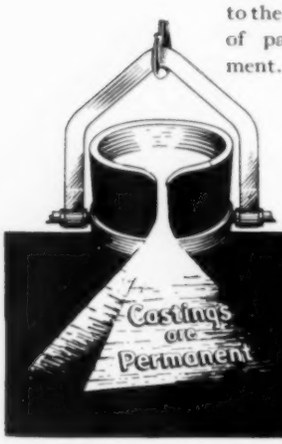

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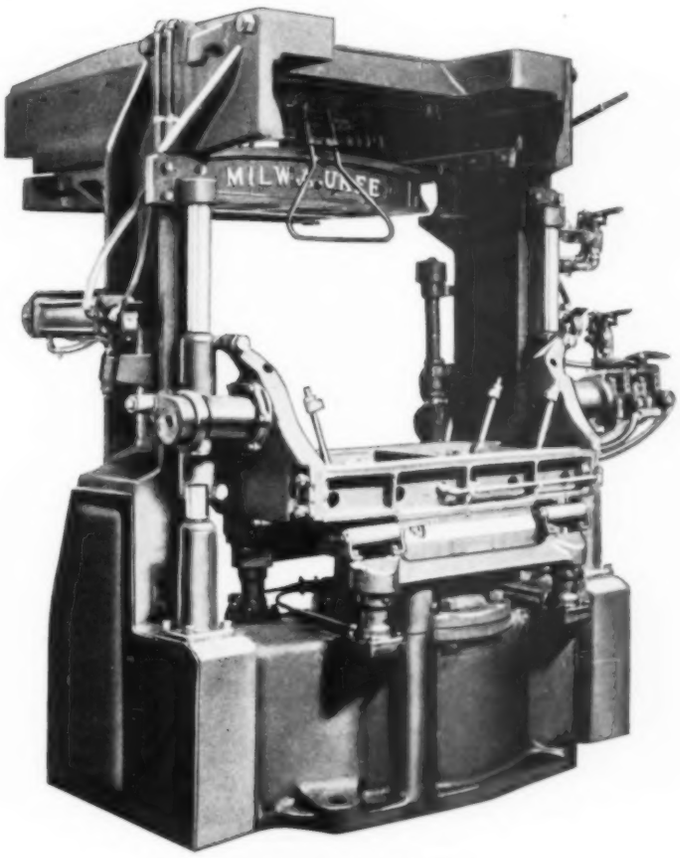

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For the larger flask sizes. Incorporates automatic mold lift off for maximum production requirements.

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(*Continued from page* 129)

88-10-2, 85-5-5-5, 80-10-10, etc. Metal should be poured directly from the melting crucible into the mold. All other things being equal, the quicker the metal solidifies, the higher the brinell hardness of the casting will be.

The same very careful thought and study should be given to designing gates as is usually given in designing castings. Mr. George had some interesting slides illustrating his many points. By the large number of questions which followed his address, it appeared that everyone present considered it a most profitable and enjoyable evening.—*M. A. Hosmer.*

New Jersey

IF EMPLOYES believe that wage rates are determined on basis fair to all, one of the major problems of industrial relations has been solved, A. L. Kress, director, department of industrial relations, Metal Trades Association, told members of the New Jersey Foundrymen's Association at their regular monthly meeting, Essex House, Newark, N. J., March 24. To this end, the speaker said, application of a scientifically conceived job evaluation plan can prove invaluable. Mr. Kress described a method of setting wage rates by job evaluation that has proved highly successful and has been applied by more than 240 plants of members of the National Metal Trades Association during the past 2 years. It was revealed at the meeting that at least four foundries in the local New Jersey district were now using this plan, and certain of their representatives spoke informally on their experiences and described the various benefits obtained.

About 120 attended the meeting which was held jointly by the ferrous and nonferrous divisions of the association. John C. Phelan, Benjamin Eastwood Co., Paterson, N. J., president, presided. John L. Carter, secretary, discussed various phases of New Jersey state industrial legislation recently enacted and proposed, and urged all members to maintain a live interest in developments in the state capitol so as to protect as fully as possible their own interests. The secretary also directed attention to the increasing shortage of scrap in the district and said that a survey was being made among the member plants as to their dependency on rail scrap. G. W. Hannay, Barnett Foundry & Machine Co., Irvington, N. J., and former president of the association, took occasion to thank foundrymen for offers of assistance in the handling of work at the time of the fire in his company's pattern shop a short while before. He said these offers came not only from local foundry companies, but from those as far west as Illinois. He said that fortunately they did not have to avail themselves of this assistance and that the company had been able to continue production in the plant without a let down.

Describing his evaluation plan, Mr. Kress pointed to two basic fundamentals of sound industrial relations: A fair salary and wage policy; and a competent supervisory force which understands and follows the basic principles of working with other people. The salary and wage policy should be based on three principles: Adoption of a general salary or wage level at least equal to rates paid for comparable work in the community; establishment of proper differentials between jobs based on their relative skill, experience, responsibility and effort; and the rewarding of individuals in similar classifications on the basis of merit. Certain steps, the speaker said, must be taken to make these principles effective.

First of all the company should adopt and use a job rating plan as a basis for job classifications. Second, it should know what the prevailing rates of pay in its community are, through adequate wage surveys. Third, it should use an employe rating plan as a basis of impartially appraising individual merit and performance. The successive steps are: Rating the jobs in each department with the foreman; classifying the men according to duties; reviewing the job ratings for the entire plant with a committee from top management; preparing a correlation chart showing the existing rate; and setting up a wage scale. The speaker illustrated his remarks with numerous stereopticon lantern slides.—*B. K. Price.*

Reading

REGULAR meeting of the Reading Foundrymen's Association was held at the Berkshire Hotel, Reading, Pa., on March 18. The meeting was called to order by President H. P. Good. The speaker of the evening, R. J. Keeley, chief metallurgist, Ajax Metal Co., Philadelphia, chose the subject, "Nonferrous Melting Practice." His discussion presented specific cases of actual experiences and methods proposed by which the problems were solved, with particular bearing on problems resulting from selection of metals not suited for the use for which the castings were intended, improper methods of melting and faulty foundry practice. Motion pictures of the association's picnic held last June were shown for the first time, and there were a few red faces in the crowd. These pictures were taken without the knowledge of the members in many instances, and one that was particularly funny, portrayed one of the members looking all over the place for an article that he had in his hand all the time. Following the pictures of the picnic, a colored film showing 15 different industries in Berks county were presented. There were 90 foundrymen at the meeting.—*H. C. Cummings, secretary.*

Central Indiana

ATTENDANCE of several officers of the national association, the election of chapter officers for the coming year, as well as a discussion of "Practical Foundry Costs" featured the final meeting of the season of the Central Indiana Chapter held April 7 at the Washington Hotel, Indianapolis. Approximately 100 members and guests were present for the technical meeting and I. R. Wagner, chapter chairman presided. Herbert S. Simpson, president, National Engineering Co., Chicago and vice president of the A. F. A., C. E. Hoyt, executive vice president, and E. O. Jones, director of safety and hygiene were present. Mr. Simpson and Mr. Hoyt spoke briefly following dinner, and Mr. Hoyt commented also on the membership program.

Officers elected for the coming year include: Chairman, H. B. Harvey, president, Indiana Foundry Corp., Muncie, Ind.; vice chairman, B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis; J. P. Lentz, International Harvester Co., Indianapolis, re-elected treasurer and R. A. Thompson, Electric Steel Castings Co., Indianapolis, re-elected secretary. Directors elected to serve 2 years are: I. R. Wagner, Electric Steel Castings Co., Indianapolis; W. L. Seymour, Hoosier Iron Works Inc., Kokomo; Richard H. Bancroft, Perfect Circle Co., New Castle; W. B. Ballantine, Haynes Stellite Co., Kokomo; Charles Beckett, Beckett Bronze Co., Muncie. Robert Langenskamp, Langenskamp-Wheeler Brass Works, Indianapolis, was elected a director to serve 1 year.

Ralph H. Lee, comptroller, Grede Foundries Inc., and Milwaukee Steel Foundry division, Milwaukee, and

(*Continued on page* 135)

(*Continued from page* 132)

chairman of the A. F. A. cost committee gave a thorough talk on "Practical Foundry Costs." He discussed the subject fully and the questions asked were covered thoroughly by his practical experience.—*R. A. Thompson, secretary.*

Quad-City

GUESTS at the March 17 meeting of the Quad-City Chapter were Robert E. Kennedy and E. O. Jones from the association's Chicago office as well as several members of the Chicago Chapter. The meeting was held at the Blackhawk hotel, Davenport, Iowa, with A. H. Putnam, vice chairman of the chapter presiding. Principal speaker was E. K. Smith, Electro Metallurgical Co., Detroit, who discussed, "Alloy Additions to Cast Iron." Mr. Smith pointed out that alloys in cast iron should be used only where needed and for a definite purpose, such as to gain strength, resistance to wear, heat or some other desired characteristic. Specific jobs from foundries were discussed to show need and the effect of the alloys on cast iron.

The nominating committee was appointed with Hyman Bornstein as chairman, and J. H. Ploehn and H. F. Henninger as members. Mr. Kennedy and Mr. Jones spoke briefly on the activities of the A.F.A. and its membership.—*J. Morgan Johnson, secretary.*

St. Louis

PRINCIPAL speaker at the March 13 meeting, St. Louis District Chapter, was A. W. Gregg, foundry engineer, Whiting Corp., Harvey, Ill. Mr. Gregg's reputation and universal interest in the subject of "Cupola Operation" brought out a good attendance. Covering practically every phase of cupola work, Mr. Gregg presented many points of information based upon observation and experience through his many years of foundry activity. This experience was of much assistance to him in leadership of the round table discussion that followed.

Preceding the regular meeting, E. O. Jones of the national office, spent some time with the board of directors stimulating interest in the current A.F.A. membership campaign, and also spoke to the group briefly during the regular meeting.

Mention was made of the closing night of the St. Louis District Chapter foundry practice school. Under the capable leadership of Carl Morken, the school did exceedingly well with a registration of approximately 300 and a fine average attendance. During the final evening of school, a number of attendance awards were made through the cooperation of the Chicago office of the A.F.A. and the Penton Publishing Co., Cleveland, publishers of THE FOUNDRY.

A large and interested group of foundrymen and their friends attended the April 10 dinner and meeting of the St. Louis District Chapter, held at the DeSoto hotel. Membership committee chairman, Richard K. Durkan, reported continued increase in memberships, mentioning recent new members. It was announced on behalf of the entertainment committee that the annual picnic will be held at the Joe Davies Ferguson Country club on Saturday, June 14, and will feature among many other things, fried chicken and barbecue.

A round table conference group was announced for the May meeting. The conference is for nonferrous, steel and gray iron. It was pointed out that the May meeting also would be the annual business meeting and the final session of the year.

Carter Bliss, chairman, announced the appointment of a nominating committee to submit candidates for the coming year. Emil Georgei, St. Louis Pattern & Model Co., was designated chairman with John Williamson, M. A. Bell Co.; Albert Hard, St. Louis Steel Casting Co., Francis O'Hare, Central Brass Aluminum Foundry Co.; Walter Illig, Banner Iron Works; Carter Bliss, O. P. M., and J. W. Kelin, Federated Metals division, American Smelting & Refining Co.

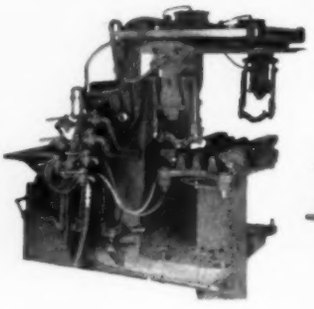
Speaker of the evening was Roy Jacobsen, general superintenedent, Carondelet Foundry Co., St. Louis. Mr. Jacobsen's subject was, "Pattern Design and its Relationship to Molding Costs." Mr. Jacobsen's talk was definitely one of the most interesting of the year. He pointed out the importance as well as the economy of consultation between foundryman, patternmaker, and the casting buyer before preparation of patterns and the patterns final entry into a foundry for casting purposes. Intense discussion followed presentation of Mr. Jacobsen's talk,—discussion participated in by the majority of those present.—*J. W. Kelin, secretary-treasurer.*

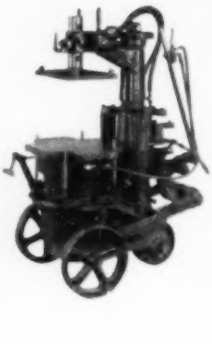
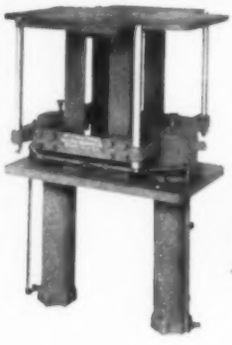
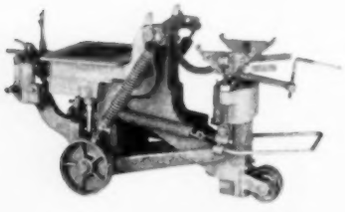
Central New York

FOUNDRYMEN of Central New York Chapter journeyed to Cornell University, Ithaca, N. Y., March 14 for the regular meeting of the chapter. The faculty of Cornell was well represented by the presence of Professors Barnard and Davis, Drs. Mason and Rhies, and others. Seventy-five foundrymen reported for the dinner and this number was augmented by late arrivals for the lecture. Chairman Wheeler opened the meeting by in-

(*Continued on page* 138)

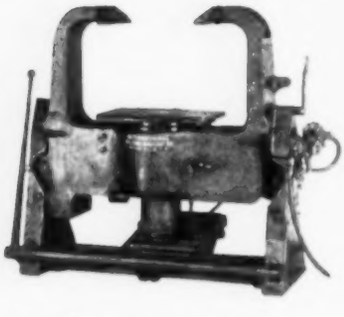
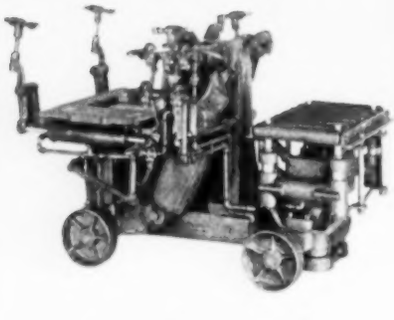
Secretary Jack Kelin of the St. Louis Chapter hands a lucky winner his ticket for a year's subscription to THE FOUNDRY while Carl Morken and Lou Desparois look on. Photo courtesy of Bob Jacoby, Key Co., East St. Louis, Ill.



INTERNATIONAL MOLDING MACHINES

For Castings

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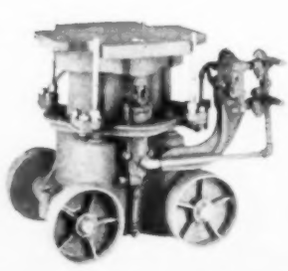
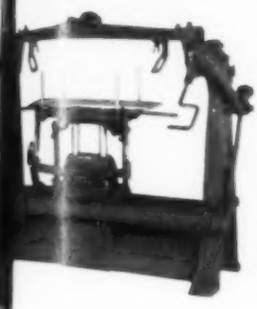
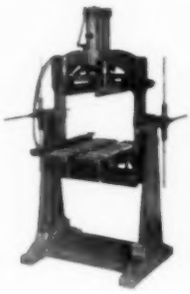
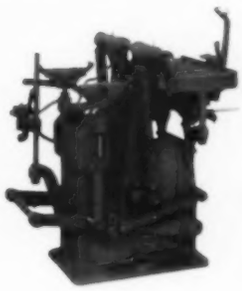
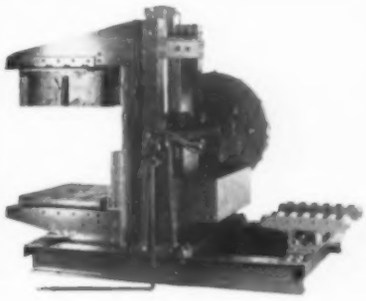
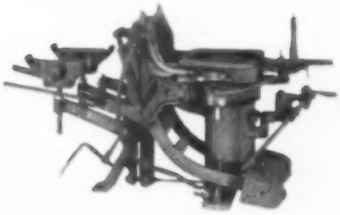
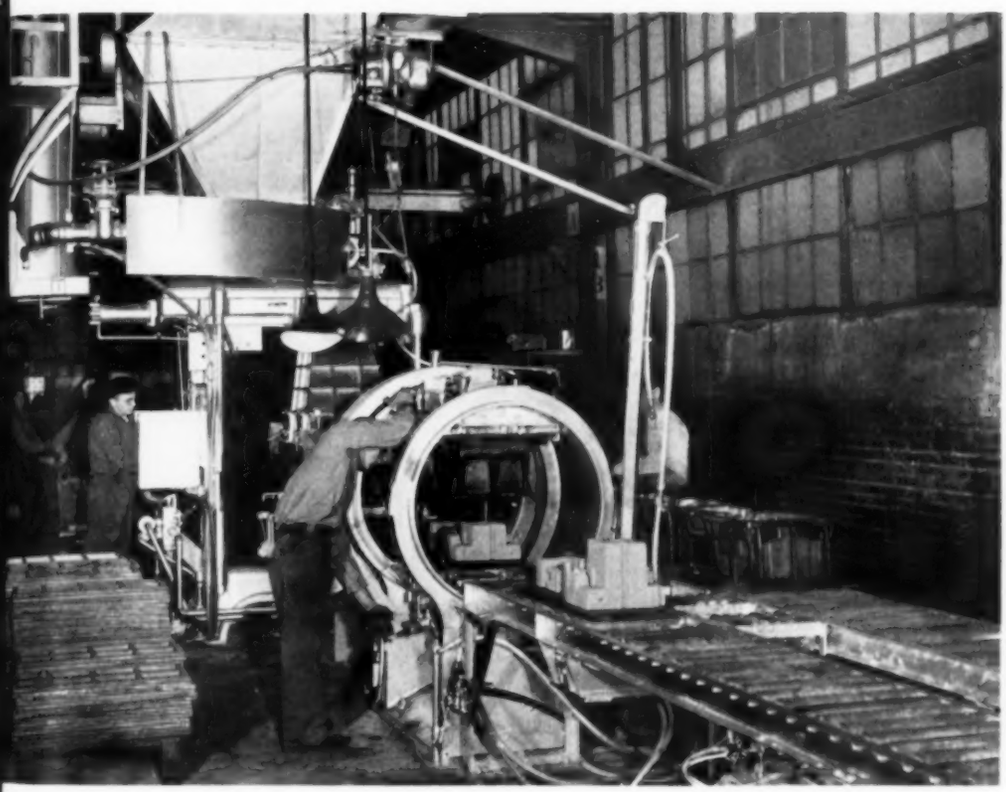


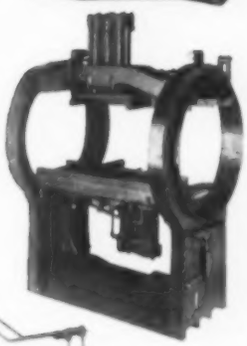






INTERNATIONAL MOLDING MACHINES

For Cores



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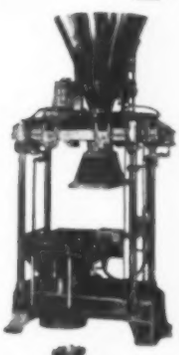

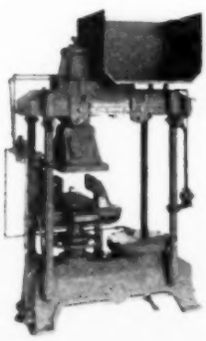

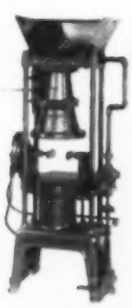
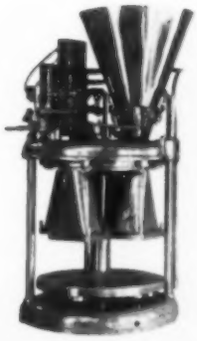
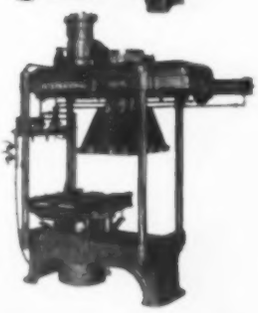

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troducing Robert Thrasher, who performed feats of magic for the entertainment of those present. The foundrymen discovered that it was as difficult to diagnose Mr. Thrasher's repertoire of tricks as is the case with a great many casting jobs in the foundry. William George of R. Lavin & Sons, Chicago, and C. O. Burgess, Union Carbide & Carbon Co., Niagara Falls, N. Y., were introduced to the group as the two speakers for the evening. Mr. George spoke to the nonferrous group and Mr. Burgess to the ferrous group.

Mr. Burgess opened his lecture by placing an outline upon the blackboard covering the reaction of certain elements upon the carbon structure. He discussed the outline thoroughly and stated that the strength and deflection is increased by ladle additions of concentrated silicon and manganese. The use of graphitizers results in smaller graphite flakes and lessens the tendency of walls to chill. If too much silicon bearing alloy is added to soft iron, the metal may retain gas through excessive graphitization and in a great many instances the addition of an excessive amount of alloys will have a reversing effect. Chromium as an alloying element stabilizes combined carbon. Higher contents of chromium increase the resistance to abrasion and often is used in combination with phosphorus. However, after heat treating, phosphorus loses its effectiveness. Molybdenum is one of the most active elements that can be added to iron. Very small additions have a marked effect on the strength and refines the pearlitic structure. In answer to a question from the floor, Mr. Burgess stated that to heat-treat iron satisfactorily by flame hardening, the carbon must be in the carbide form. —*L. D. Wright, secretary.*

Mr. George gave an interesting talk on "Brass Foundry Practice." He discussed the effect of various molding sands on the smoothness and soundness of castings, stating that the secret of smooth castings lies in the condition of the sand, not in the fineness. He stressed the importance of directional solidification and showed on a number of lantern slides and actual samples of castings, how in each case shrink cracks and porosity were overcome by observing the law of directional solidification. Melting practice was discussed next, covering the effect of furnace atmosphere on the metal and the methods of checking it. There is no cure-all regardless of the type of furnace used; either coke, oil fired, or electric furnaces will produce good or bad metal. A thorough understanding of the proper melting procedure is essential. A question and answer period terminated the instructive session.—*Max Ganzauge.*

Michiana

FINAL meeting of the Spring session for the Michiana Chapter was held April 1 at the LaSalle hotel, South Bend, Ind. R. J. McSherry, chairman of the nominating committee, presented the nominations and the following officers were elected to serve the coming year: chairman, E. C. Bumke, Oliver Farm Equipment Co., South Bend; vice chairman, H. Klouman, Michiana Products Corp., Michigan City, Ind.; and L. L. Andrus, American Foundry Equipment Co., Mishawaka, Ind., was re-elected secretary-treasurer. The four directors to replace those whose terms expire in 1941 will be elected at a later date which will be announced.

Speakers for the evening included Martin J. Lefler, Western Foundry Co., Chicago, who gave an interesting talk on cupola practice with particular attention to alloy additions under the trying times of alloy scarcity; R. J. McSherry, Studebaker Corp., South Bend, who recently returned from Washington where he was in conference on priority matters, gave some highlights regarding that situation; J. A. Westover, Clark Equipment Co., Buchanan, Mich., discussed the advantages of the time study in setting up piece work prices based on predetermined formulas; E. W. Beach, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., gave a brief talk and told the group of the baby chapter which has been organized at Muskegon and Grand Rapids.—*M. F. Doty, chairman.*

Chicago

SURFACE finish of castings is an item which profoundly affects cleaning costs and salability of the product. The better the finish, the less the amount of cleaning required, and the more acceptable are the castings to the purchaser. Consequently, the Chicago Chapter devoted its April 14 meeting at the Chicago Towers club, Chicago, to the subject of how sand influences the finish.

About 200 members and guests of the chapter attended and gave a head start to a membership drive which will be carried on during the next few weeks.

W. G. Reichert, general foundry metallurgist, American Brake Shoe & Foundry Co., Mahwah, N. J., was the speaker. In introducing the topic of surface finish of castings as affected by sand, he stated the factors involved include fineness of the sand, moisture content, amount of sea coal, condition of the mold, and temperature and fluidity of the molten metal. All these factors must be adjusted in relationship to each other to obtain the highest degree of surface finish. The speaker outlined an exhaustive series of tests to determine the influence of each factor. In these tests, only one factor was varied at a time while the others were held constant.

Announcement was made at the meeting that the Chicago, Michiana and Central Indiana chapters of the association will conduct a regional foundry conference at Purdue University, West Lafayette, Ind., Oct. 17-18. Committees are now being set up and the program arranged.

Nominations for 1941-42 chapter officers were reported as follows: Chairman, L. L. Henkel, metallurgist, Interlake Iron Corp.; vice chairman, A. G. Gierach, assistant plant manager, American Manganese Steel division, American Brake Shoe & Foundry Co., Chicago Heights, Ill.; treasurer, Charles C. Kawin, president, Charles C. Kawin Co.; and secretary, B. L. Simpson, vice president, National Engineering Co. Election will be held at the May 5 meeting, which originally had been scheduled for May 12.—*E. F. Ross.*

Philadelphia

ABOUT 200 foundrymen and friends turned out to greet President L. N. Shannon of the A. F. A. at the meeting of the Philadelphia Chapter at the Engineers club, March 14. Dinner was served in true Philadelphia style and was topped off by a delightful talk by Dr Philip J. Steinmetz, rector of St. Pauls Church, Elkins Park, Pa.

President Shannon stressed the point that the A.F.A. is truly a technical and educational association which now has 20 chapters and stated that the national office is ever ready to serve its chapters in their plans for increased membership and in directing the formation of new chapters. C. E. Hoyt, executive vice president of A.F.A. and Marshall Post, a past president, also addressed the membership.

Technical chairman of the evening was R. W. Wilson, Reading, Pratt & Cady Co., Reading, Pa. He presented Victor A. Crosby and E. R. Young, Climax Molybdenum Co., New York, who spoke on "Molybdenum in Iron and Steel." Mr. Young spoke on molybdenum in steel and accompanied his talk with appropriate slides. Molybdenum addition in steel castings tends to improve

(*Concluded on page* 143)

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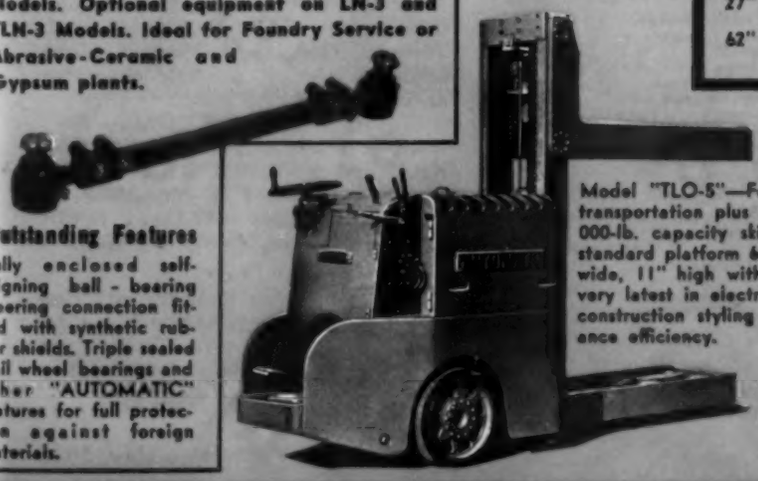

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FOUNDRY ACTIVITIES

NATIONAL Bearing Metals Corp., 5331 West 66th street, Chicago, manufacturer of brass and bronze alloy castings used primarily in steel mill maintenance, is preparing to build a 5200-square foot addition which will increase plant floor area about 30 per cent. Plant also includes installation of new furnaces to double present furnace capacity.

* * *

Link-Belt Co., Eastern avenue, Toronto, Ont., plans immediate addition to its plant to cost $40,000.

* * *

Kirsch Foundry Co., Beaver Dam, Wis., is building a foundry addition 22 x 72 feet.

* * *

D. J. Murray Mfg. Co., Wausau, Wis., is building a one-story addition.

* * *

Prescott Co., Menominee, Mich., has let general contract for a one-story plant addition.

* * *

Wehr Steel Co., West Allis, Wis., is building a one-story pattern shop 25 x 90 feet.

* * *

Metal & Alloys Ltd., Wiltshire avenue, Toronto, Ont., will build an addition and make alterations to its foundry at cost of about $35,000.

* * *

Sheboygan Foundry Co., Sheboygan, Wis., has let general contract for a one-story foundry addition on Union avenue.

* * *

Gerlinger Brass & Aluminum Foundry Co., West Allis, Wis., has plans for a one-story foundry addition.

* * *

Tennessee Copper Co., Copper Hill, Tenn., plans additions and alterations to its plant to cost about $1,000,000.

* * *

Kinney Iron Works, 2525 East Forty-ninth street, Los Angeles, is erecting an addition to its foundry at a cost of $3000.

* * *

Cuyahoga Foundry Co., 4530 East Seventy-first street, Cleveland, has added an addition of modern design and construction to its foundry, increasing the floor space approximately 12,000 square feet. A new core oven and a 20-ton crane are being installed. James V. Proshek is president.

* * *

F. N. Miller Foundry Co, Lancaster, Pa., is rebuilding its burned brass and aluminum foundry at a cost of approximately $40,000.

* * *

Federal Mogul Corp., Detroit, has purchased the rights and interests in stock motor boat propellers up to 50 inches in diameter from the Hyde Windlass Co., Bath, Me.

* * *

Busch Sulzer Bros. Diesel Engine Co., 3300 South Second street, St. Louis, is building a one-story factory building 120 x 270 feet.

* * *

Marsh Valve Co., Dunkirk, N. Y., is building a one-story foundry addition to cost more than $50,000 with equipment.

* * *

Eastern Foundry Co., Boyertown, Pa., recently has provided a group policy involving $163,500 for the protection of 302 employes. Each worker is eligible to coverage in amounts ranging from $500 to $1500, according to rank or position held. The policy, issued by the Prudential Insurance Co., is of the non-contributory type.

* * *

Banner Iron Works, 4630 Shaw avenue, St. Louis, has let contract for repairs to its plant damaged by fire, at estimated cost of $10,000.

* * *

Security Pattern Works, 1646 Tarleton street, Los Angeles, has been formed by Rex D. Barnett and William A. Herring.

* * *

Plans are being prepared for the construction of a foundry building to cost $12,000 on the campus of the Pasadena Junior College, Pasadena, Calif.

* * *

Hoosier Foundry Inc., 1022 East Michigan street, Indianapolis, has been incorporated with 1000 shares no par value to produce castings, by Edward Workman and associates.

* * *

Pontiac Motor Division foundry of General Motors Corp., Pontiac, Mich. is building an addition 60 x 367 feet to its cleaning room, at an approximate cost of $90,000.

* * *

An addition 92 x 300 feet is being built at the plant of Bohn Aluminum & Brass Corp. on East Grand boulevard, Detroit, at an estimated cost of $175,000.

* * *

Akron Bronze & Aluminum Co., Akron, O., plans erection of an addition for cleaning room and pattern storage. H. A. Ehmann is president.

* * *

Toronto Foundry Co. Ltd., Landsdowne avenue and Davenport road, Toronto, Ont., is building a plant addition costing $15,000, exclusive of equipment.

* * *

General Foundry Co. is the firm name under which Thomas A. Conley has obtained a certificate to conduct business at 11903 South Alameda street, Compton, Calif.

* * *

Taylor-Wharton Iron & Steel Co., recently has purchased and are installing a new 5-ton Pittsburgh Electromelt furnace of top-charging

(*Concluded on page* 143)

RAW MATERIAL PRICES
April 16, 1941

Iron	
No. 2 foundry, Valley	$24 to 24.50
No. 2 Southern Birmingham	20.00
No. 2 foundry, Chicago	24.00
No. 2 foundry, Buffalo	24.00
Basic, Buffalo	23.00
Basic, Valley	$23.50 to 24.50
Malleable, Chicago	24.00
Malleable, Buffalo	24.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$6.00 to $6.60
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	11.50
Scrap	
Heavy melting steel, Valley, No. 2	$19.00
Heavy melting steel, Pittsburgh, No. 2	19.00
Heavy melting steel, Chicago, Auto No. 2	17.75
Stove plate, Buffalo	17.00
Stove plate, Chicago	17.60
No. 1 cast, mchy., New York	
No. 1 cast, mchy., Chicago	22.60
No. 1 cast, Pittsburgh	
No. 1 cast, Eastern Pa.	
No. 1 cast, Birmingham	
Car wheels, iron, Pittsburgh	
Car wheels, iron, Chicago	
Railroad malleable, Chicago	
Malleable, Buffalo	23.50
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	12.25
Straits tin	52.25
Aluminum, 99 per cent	17.00
Aluminum, No. 12 (Secondary, standard)	16.00
Lead, New York	5.85
Antimony, New York	14.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill	7.25

(*Concluded from page* 140)

design. This installation is part of the modernization program of its High Bridge, N. J., plant, to increase its production of manganese steel and other alloy castings.

* * *

American Foundry, 7001 Anaheim-Telegraph road, Los Angeles, has added corrugated iron structure 42 x 80 feet to its foundry and costing $3800.

* * *

Allyne-Ryan Foundry Co., Aetna road and East Ninety-first street, Cleveland, is considering plant additions to accommodate enlarged production needs.

* * *

Hammond Brass Works, 1844 Summer boulevard, Hammond, Ind., is enlarging its brass foundry facilities at a cost of $5000. An addition, 50 x 50 feet, is being constructed.

* * *

Western Brass Works, 1441 Naud street, Los Angeles, is building an addition to its foundry to prove 2338 additional square feet of floor space and to cost approximately $1000.

* * *

Brooks Furnace Co., Albion, Mich., has built a new foundry. Production will start in the new building about May 15. The company is making a new type fin warm air furnace.

* * *

Omaha Steel Works, 609 South Forty-eighth street, Omaha, Neb. is expanding its plant facilities to the extent of approximately $40,000. Plans include extensions to machine shop and other departments.

* * *

Duriron Co., Dayton, O., has awarded general contract to B. G. Danis Co. for an addition of 20,000 square feet to its main plant and several auxiliary buildings, at a cost of about $75,000.

* * *

W. A. Jones Foundry & Machine Co., 4401 Roosevelt road, Chicago, has let general contract to H. E. Weede Construction Co. for a two-story 76 x 92-foot addition, costing about $45,000.

* * *

Wellman Bronze & Aluminum Co., 6017 Superior avenue, Cleveland, has leased a one-story, sawtooth constructed building 350 x 120 feet to increase its production of magnesium and bronze castings. The company has leased 2 acres of additional land to be used for the storage of sand and materials, as well as a parking space.

* * *

Index of foundry equipment orders for March, 1941, according to a report of the Foundry Equipment Manufacturers Association, Cleveland, was 315.2 as compared with 281.1 in February. Index of orders for new equipment was 329.3, and for repairs 272.7. The index of 100 represents the monthly average of reported sales to metalworking industries during 1937-38-39.

* * *

Strom Brass Foundry, 2646 South Main street, Elkhart, Ind., is building a foundry addition 42 x 42 feet to cost about $3000. The addition will house melting furnace room and core room.

* * *

Chicago Gear Mfg. Co., 2823 West Fulton street, manufacturer of steel, cast iron and nonmetallic gears, is building an addition 75 x 150 feet, costing $150,000 to increase manufacturing facilities about one-third.

* * *

Model Brass Co. Inc., 232 East Decatur street, Decatur, Ill., is constructing a one-story, 60 x 80-foot brick and block addition to its plant to be used for working and storage space. The unit will double size of the present plant.

* * *

Hansell & Elcock Co., 3153 South California avenue, Chicago, recently has inaugurated a co-operative program through which hospital expense, surgical operation benefits and life insurance are provided its employes.

* * *

Northern Bronze Corp. recently has moved from the Southeast corner of Tenth and Tioga streets, Philadelphia, to the Northwest corner, Torresdale avenue and Womrath street, Philadelphia.

* * *

Columbia Steel Co., Pittsburg, Calif., will supplement existing open hearth melting facilities in its foundry department with an electric furnace to permit the prompt execution of its casting orders requiring special steel compositions including alloy steel.

* * *

National Youth Administration at Tulsa, Okla., has received materials and equipment for a foundry project. Youths will be taught casting and other phases of foundry practice. The first job calls for casting several hundred lids for city water meters. The foundry will be located at Newblock park.

* * *

Logansport Foundry Equipment Co., Logansport, Ind., has purchased the machinery and equipment of the Mutti Foundry Co., Bremen, Ind., and has moved the equipment to Logansport, where it will be operated in conjunction with the production of cast iron radiation and jobbing castings.

* * *

American Magnesium Corp., Buffalo, subsidiary of Aluminum Co. of America, is preparing plans to double its present capacity at an estimated cost of $3,000,000, including building and equipment. Product will be sand castings of magnesium for aircraft and other defense purposes.

Philadelphia Group

(*Concluded from page* 138)

hardness, tensile strength, toughness, low temperature impact and abrasion resistance. Moderate additions result in good hardening qualities in heat treatment and advantages are secured at much lower temperatures than from unalloyed castings. Mr. Crosby's talk was on molybdenum in gray iron castings and he mentioned that foundrymen were beginning to realize that graphite is one of the most important elements to watch, particularly where high test iron is desired. Molybdenum additions in cast iron have all the advantages that are gained in cast steel, except the base metal in gray iron having elements in such large percentages—such as graphite, silicon, etc.,—must be watched more carefully than is necessary in steel to get satisfactory results.

A lively discussion followed these talks and everyone had an opportunity to have his particular questions answered. Nominating committee composed of Messrs. Yost, Schley with Hartman as chairman, presented the following nomination of officers and directors for the ensuing year: Chairman, Harry Reitinger, U. S. Cast Iron Pipe & Foundry Co.; vice chairman, D. J. Peake, Florence Pipe & Foundry Co.; secretary-treasurer, W. B. Coleman, W. B. Coleman & Co. Directors: R. S. Munson, Atlantic Steel Castings Co., and Robert Latham, Bethlehem Steel Co.—*J. T. Fegley, chairman, publicity committee.*

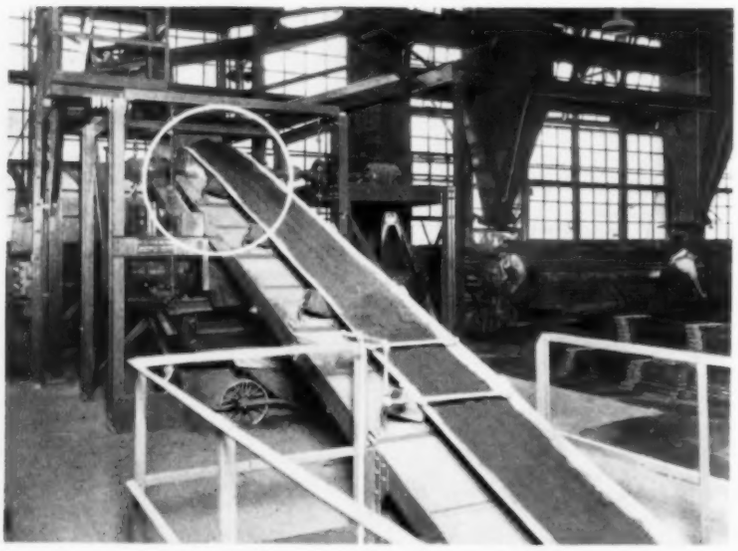
Book Review

Dangers and Health Hazards of Fire Gases, by Harold Joe Davis; paper; 12 pages 6 x 9 inches for sale by the author at 3927 East Admiral Place, Tulsa, Oklahoma, for 25 cents post paid.

Purpose of the booklet is to familiarize those responsible for industrial and public safety on the dangers and health hazards of fire gases. The publication touches on the following items: Action and behavior of fires, reactions of materials under fire conditions, materials capable of producing lethal fire gases, gas sampling apparatus, laboratory and field tests for new materials, reactions of combined fire gases, two fold dangers of fire gases; materials chemicals and gases dangerous to life under fire conditions. Forty items are listed under the last heading.

Making Foundry Sand

IRON, in the form of sprues, risers, gates and fine shot in foundry sand causes poor molds, poor castings, blowholes, imperfections and rejects. It reduces the life of the sand and it's iron that's LOST TO PRODUCTIVE USE. That iron must be removed, and screening isn't a good enough way to do it. The only positive way, the truly economical way to remove that iron is by magnetic separation and Dings Magnetic Separation leads the field. It removes ALL the iron—speeds up and reduces the cost of sand conditioning—makes foundry sand pay real dividends.



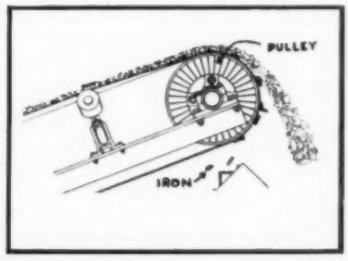
ABOVE—Dings HIGH INTENSITY Magnetic Pulley at Chain Belt's grey iron foundry in Milwaukee.

The Dings Magnetic Pulley

The Dings *High Intensity* Magnetic Pulley is the ideal separator to use wherever belt conveyor systems are used. Dings Pulleys are completely automatic, have high capacities and cost little to operate.

It is the *most powerful magnetic pulley on the market* size for size. Non-magnetic bronze spacer rings do not short-circuit lines of force. Air-cooled design, with nearly twice the heat-radiating surface of other pulleys, insures cooler and hence more powerful operation. A real money maker!

How The Pulley Works: Replacing head drive pulley on your present conveyor, the Dings Pulley attracts all iron and holds it to the belt surface until it passes underneath and out of magnetic field where it discharges. The sand passes over the pulley in a normal trajectory. Simple—positive—completely automatic—dependable.

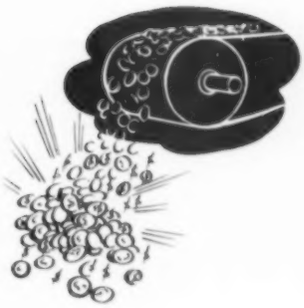


The Pulley Type Separator

The Dings High Intensity Pulley Type Separator is a self-contained unit consisting of a Dings Magnetic Pulley, idler pulley, conveyor belt, frame, etc. These units are built to fit the requirements of any existing sand handling system. They pay for themselves quickly, then make bigger profits a reality. Dings Catalog 250 gives complete details, specifications, etc., on the complete line of Pulleys and Pulley Type Separators. Available on request.

RIGHT—Dings Pulley Type Separator at Wehr Steel Co. foundry. Wehr says: "time saving and reclamation of metal otherwise lost with refuse sand will pay for this unit in a short time."

Pay Dividends!



Dings Magnetic Drums

Where for any reason it is not desirable to carry sand on belts, Dings Magnetic Drums can be installed at the discharge of screens, vibrators, apron conveyor pulleys, etc., to provide effective iron removal. The Drum consists of a revolving stainless steel tubular shell surrounding High Intensity magnetic coils. Operation is similar to that of the pulley — iron is attracted to the drum surface and held there until it passes out of the magnetic field where it discharges.

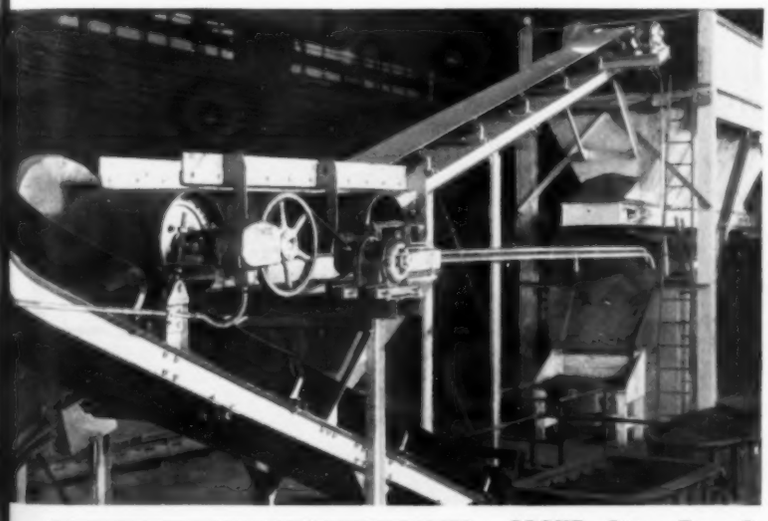
Another cost-cutting, profit boosting separator!

Dings Catalog 660 describes in full the complete line of Dings Magnetic Drums. Available on request.

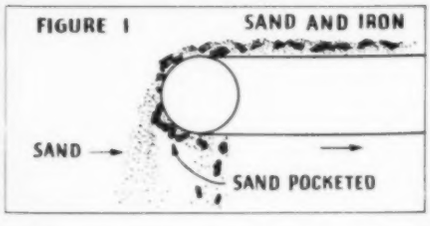
Principle of Operation —Dings Magnetic Drum.

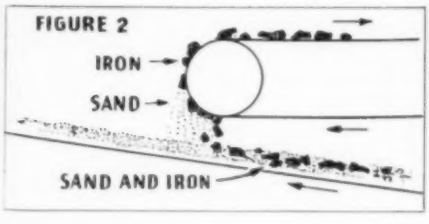
Selective Separation Type D Principle

The Dings Type D Separator is, in effect, a Pulley Type unit operating in reverse and mounted above an inclined belt conveyor. It is designed to *pick* the iron *cleanly* out of the sand, eliminating any discharge of sand with the iron as is sometimes encountered with other separation methods. Referring to Figure 1, it can be seen that some sand can be "pocketed" and discharged with the iron when passing over a magnetic pulley. Figure 2 shows how the Type D Separator combines magnetic attraction, and gravity to pull the iron *up out of the sand*, entangled sand dropping back on to the inclined belt. The iron is carried up and over the magnetic pulley and discharged into a chute where it is shunted to any desired point or receptacle. Another unit that "picks" out the dollars!



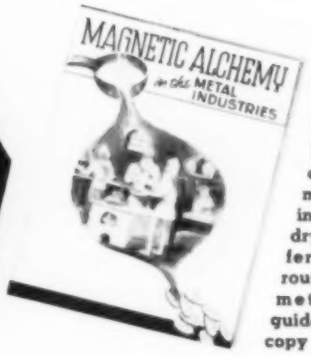
ABOVE—Dings Type D Separator at Allis-Chalmers, Milwaukee.





DINGS MAGNETIC SEPARATOR CO.
675 Smith Street **Milwaukee, Wis.**

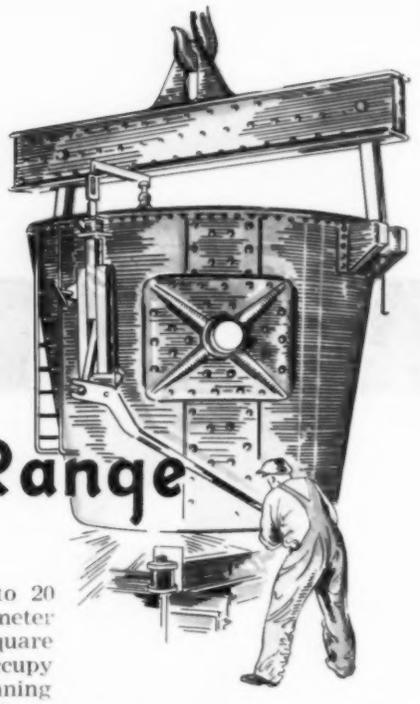
Send for this NEW BULLETIN!



"MAGNETIC ALCHEMY"

New 8 Page Metal Industries Catalog describes 10 Dings machines for removing iron from foundry sand—separating ferrous and non-ferrous scrap—handling metal. A valuable guide. Write for your copy TODAY.

Foundry DEVELOPMENTS At Short Range



ONE steel foundry which produces a large quantity of small gears used in brake control mechanism for freight cars employs a rapid method of removing risers on the castings through use of a portable oxy-acetylene cutting machine set up. The set up includes a combination track and work support made of angle iron construction about 6 feet long. Upper level or track consists essentially of two parallel lengths of angle iron. One length supports the drive wheel at the front of the cutting machine while the second guides the rear wheels in a straight line. The lower level, located forward of and below the track, serves as a rack on which the castings are placed. Angles making up the rack are arranged so that the gears can be positioned quickly in exact alignment with the necked sections of the risers directly below the path of the blowpipe nozzle. It is said that risers can be removed at the rate of 250 per hour, and the cuts are kept within an allowable tolerance of 1/32-inch. No grinding or other finishing is required after the cut.

* * *

A cast manganese-molybdenum steel containing 0.25 to 0.35 per cent carbon, 1.00 to 1.35 per cent manganese, and 0.20 to 0.30 per cent molybdenum was selected for a large bulky expansion joint for several reasons. First it responds well to a comparatively simple heat treatment. Second it can be cast to a pattern where sections vary considerably without developing structural weaknesses.

* * *

In Germany due to scarcity of nonferrous metals various substitutes for bearings of those materials are being used. One type employed, particularly for roller conveyors where impacts are not too high, is made of a special cast iron which contains spiral grooves filled with graphite. The iron is claimed to have a pearlitic structure with a carbon content of 3 per cent, and a tensile strength from about 15 to 20 kilograms per square millimeter (21,335 to 28,446 pounds per square inch). The graphite inserts occupy about 50 per cent of the running surface and the depth ranges from 3 to 5 millimeters (0.12 to 0.20-inch) depending upon the thickness of the bearing. They are said to have about the same life as bronze bearings.

* * *

A recent tannic acid jelly for burn treatment devised by English doctors is made of 20 per cent tannic acid, 0.1 per cent proflavine sulphate or methyl violet, 2 per cent procaine, and sufficient glycerine-tragacanth base to make 100 per cent. The glycerine-tragacanth base consists of 2 per cent compound powder of tragacanth, 10 per cent glycerine, and distilled water to make 100 per cent.

* * *

VIBRATION-damping characteristic of cast iron led to its application for large fluid clutches for diesel powered ships. Each casting weighs 10,700 pounds in the rough and has an outside diameter of 9½ feet. Interior of the casting containing numerous ribs was formed with cores, and to eliminate use of chaplets the entire casting was made in the drag. Castings were stress relieved in the foundry by holding at 800 degrees Fahr., and slow cooling.

* * *

In Russia some experiments have been made in operating a cupola with natural gas as the fuel. Natural corundum is used instead of a column of coke, and the metal tapped has a temperature of 1380 to 1400 degrees Cent. (2516 to 2552 degrees Fahr.). It is stated that the cast iron obtained possesses satisfactory properties but improvements in the process can be made by slight changes in the design and operation of the cupola.

* * *

It is claimed that a tested antistatic belt dressing is composed of 9 ounces of fish glue, 7 ounces of glycerine, 7 ounces of sulphonated castor oil, 12 ounces of water, 6 ounces of lampblack, and 2 ounces of ammonia (2 per cent solution). Ingredients are added individually in the order given. Glue and glycerine are heated together for 2 hours with frequent stirring. The temperature should be such that the mixture barely boils, and then the other ingredients are stirred into the mixture. Amounts mentioned will make about 1 quart of dressing, and a weekly application on the pulley side while the belt is running will suffice to keep static to a negligible amount.

* * *

Metallic calcium in addition to being an effective deoxidizer and degasifier for alloy steels and alloy irons also is claimed to produce smaller grains and a denser and more uniform structure; to eliminate blowholes and fissures; increase fluidity of melt and inhibit formation of skulls through additional heat of reaction, and to provide more uniform melts through turbulence caused by its addition to the molten metal.

* * *

WHILE it is well known that the basic bessemer process reduces the phosphorus content of steel, it is only recently that dephosphorization has been applied to the acid bessemer process using cold fluxes. Flux employed is composed of 50 per cent impure lime, 30 per cent dry roll scale, and 20 per cent fluorspar. In use the regular slag formed after blowing the heat is removed by holding it back with a wooden block as the molten steel is poured into a ladle. The cold flux is added to the stream flowing into the ladle at a rate to insure a good boiling action. Reaction is said to be complete in about 30 seconds, and the phosphorus reduced from 0.095 to 0.100 per cent to 0.020 to 0.040 per cent in that time.

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Balance

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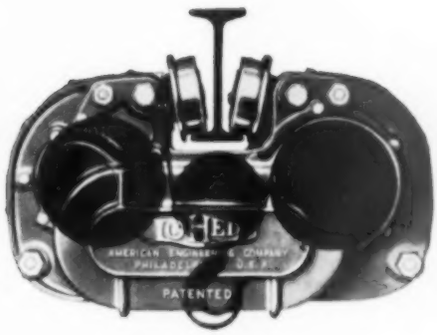
The Lo-Hed Hoist Is Applicable To Any Monorail System
There's A Balanced Lo-Hed Electric Hoist For Every Purpose

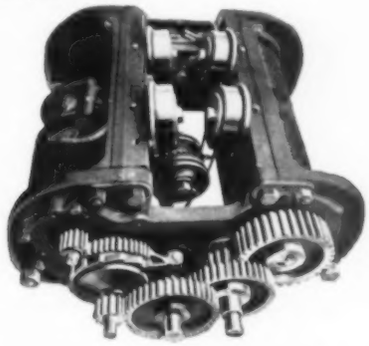
OTHER A-E-CO PRODUCTS: TAYLOR STOKERS, MARINE DECK AUXILIARIES, HELE-SHAW FLUID POWER

Look in your Classified Telephone Directory under "A-E-CO LO-HED HOISTS" for your nearest representative.



You Need BALANCE in a HOIST

LO-HED, the *Balanced* Hoist. You can instantly single out a Lo-Hed hoist because of its characteristically different appearance. Ordinarily, appearance isn't important in a hoist but it just so happens that a Lo-Hed hoist gets its appearance from a basically different construction. Motor and drum are arranged on opposite sides of the beam. The hook is directly in the center and can be pulled up close to the beam—an extra advantage where headroom is low. Because motor and drum shafts are separate and parallel the motor can be geared to the drum through efficient spur gears. Buy the hoist that's balanced if you want low operating and maintenance costs. Write for Lo-Hed catalog today.



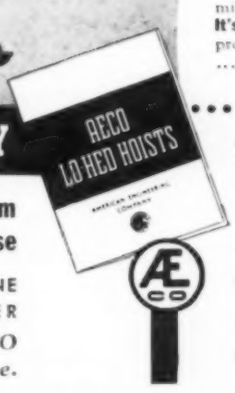
LOOK AT THE BALANCED LO-HED!

It Costs Less To Operate—All gears are efficient stub-tooth spur gears running in a sealed oil bath . . . gear shafts and trolley wheels are equipped with heavy-duty ball or roller bearings.

It Costs Less To Maintain—Sturdy construction . . . seldom, if ever, requires removal from rail . . . covers of controller, motor, drum and gearing are easily removed.

It's Safe—Factor of safety of over 5 at full capacity . . . 100% Positive Automatic Stop when load reaches upper limit . . . Automatic Holding Brake prevents load from drifting when current is shut off . . . short, strong shafts minimize torsional stresses.

It's Protected—Controller is fire, dust and moisture proof . . . motor totally enclosed . . . gearing sealed in . . . motor and drum covered by easily removable covers.



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☐ Please send me your complete catalog of LO-HED HOISTS.
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(Please print plainly)

COMMENT

BECAUSE the New York convention of the American Foundrymen's Association offers an immediate forum for the study of problems pertaining to the war effort, every man in a management or supervisory capacity should plan to be on hand for those sessions of direct interest. Attendance should not be limited to the premise of obtaining ideas of value, but should be based on the consideration of contributing knowledge to the general pool in order that the foundry industry as a whole may give an excellent account of itself in the tumultuous days and weeks that lie ahead. Planning to meet the future problems seems to be a duty of all.

Attendance at the convention also offers a welcome relief from the pressure of production which has engaged the industry for some months. Four or five days in New York should be an ideal tonic for frayed nerves.

—□—

THE OPM recently released a preliminary report of the Advisory Committee on Metals and Minerals of the National Academy of Sciences which indicates the probability of improvement in the current nickel situation. The report states that while nickel is being supplied to the United States market at a rate more than double that of any year prior to 1939, this supply at least temporarily is inadequate to meet the current even larger demands of nickel users. The report continues:

> U. S. and British defense requirements, as currently estimated, do not adequately account for this current accumulated demand, which is almost triple that of 1937, the largest nickel year prior to 1939. Building up of finished goods and process inventories (the amount of nickel in various stages of fabrication) undoubtedly is an active factor in the situation. Unless the volume of defense requirements should later definitely be established to be greater than the figure now known, or estimated, it is too early to regard the present extraordinary demand as other than temporary. In so far as it is due to inflation of inventories and building up of process inventories, it should within a few months largely subside.

The committee also states that "in the meantime, certain steps are being taken and others are proposed, looking to the intelligent conservation of the nickel supply for essential uses."

—□—

SUCCESS in purchasing materials for use in industry may depend upon more important factors than price. An interesting example is found in the following taken from a Philadelphia news report on the pig iron situation and published several weeks ago in *Daily Metal Trade*:

> The problem of obtaining sufficient pig iron is not universally a serious one. Many foundries find their requirements being filled adequately. Stocks on hand may not be all that is desired, but shipments are being received regularly and no pinch is encountered. Such plants generally are those which in the past have done business with relatively few sources of supply.
>
> On the other hand, those foundries which in recent years could not be considered steady customers of any one or more suppliers, but which shopped around in an attempt to obtain price concessions, and bought on a price basis rather than from the standpoint of service, now find themselves in trouble. Pig iron sellers are concentrating on taking care of their regular accounts and in most cases have no iron left over for disposal elsewhere. Orders are being taken right along but only from old customers, hence the appearance is given that certain buyers have a shortage of iron.
>
> Market reports indicate that "price in effect" at the time of shipment is being written into a larger portion of contracts for pig iron.

—□—

THE COMMITTEE appointed by the Wage and Hour Division of the United States Department of Labor met in Washington a month ago, and after discussions extending over the greater part of 2 days, recommended to the administrator that the minimum wage for the gray iron industry be set at 40 cents an hour. The committee consisted of five labor leaders, five men presumably representing the public, whatever that term may include, and five gray iron foundrymen from various sections of the country. I attended one session of the committee's deliberations, and feel that the entire performance was a great waste of time and money. Those in the audience could not help but feel that the labor department had arrived at the verdict long before the committee met.

—□—

PRODUCTION for war is removing many important materials from normal applications in the foundry industry, and naturally is sending experts in search of possible substitutions. Perhaps 75 per cent of the foundries in this country have been effected to considerable degree by one or more of the regulations which have been made necessary by these shortages, and the situation rapidly is becoming more complex.

Quite recently a list of problems was submitted to the metals group of the National Academy of Sciences for study. In connection with these shortages, the group is asked to find "what relatively plentiful materials could be substituted for aluminum in uses that are extensive enough to be important." Similar studies are requested for magnesium, nickel and chromium. In addition, the committee is asked to study the possibility of conserving tin in bronzes; changing the formula of various types of brass in the direction of higher copper and lower zinc content; and substituting other materials for graphite crucibles and retorts for nonferrous work and graphite stoppers for steel ladles.

This surely is a large order, and it may be just the beginning.

—□—

THIS ISSUE has been made possible through the very kind co-operation of a large number of friends. I want to thank particularly the authors of articles, the secretary and assistant secretary of A.F.A., and the members of the convention committees appointed by the Metropolitan Chapter. Fred Sefing, chairman of the publicity committee has been especially helpful.

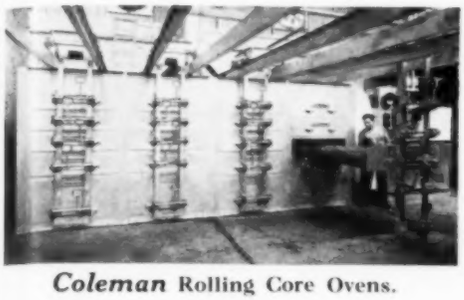
Also my thanks to Ed Bremer, Pat Dwyer, Don Cadot and Virginia Brandenburg for doing an excellent job while I have been spending most of my time in Washington.

—□—

ALL OF US will be looking forward to seeing all of you at the Hotel Pennsylvania in New York.

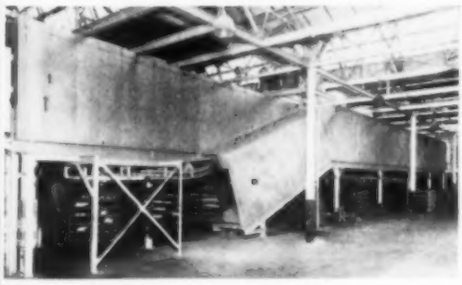
F. G. S.

Coleman Transrack Core Ovens.



Coleman Rolling Core Ovens.

Coleman TOWER Core Oven.



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CORE OVENS **COLEMAN** **MOLD OVENS**

By A. H. ALLEN
Detroit Editor, The Foundry

AMONG DETROIT FOUNDRIES

FORD engineers in recent months have been hammering away at the problem of cylinder wall construction, bore wear and oil consumption, particularly in heavy-duty engines such as those used in trucks. Some new ideas are in process of being worked out, with cast inserts or rings appearing to offer considerable promise.

It will be recalled that a year or two ago, Ford instituted the use of pressed steel liners in some V-8 engines. These liners were deep drawn from ordinary fender stock steel, after which they were heat treated for hardness by nitriding. Experiments also were made with copper plating and tin plating the surface for wear resistance instead of nitriding.

Developed Blow-by

After grueling service some truck engines with liners developed "leaker" or "blowby" cylinders, caused by an apparent buckling of the liner material near the top. In effect, the steel upset on itself under repeated heating and cooling. Some actual growth of the steel also was noted. Reason was reported to be the excessively high temperatures at this point (the top inch or so) of the cylinder wall, together with the difficulty of water cooling the block at this point because of the close spacing of the exhaust valve opening. A few blocks which were cut apart showed cooling passages clogged with sand and core wires.

Redesign of the block to open up this wall between cylinder and exhaust valve would be a difficult and expensive foundry problem, so it was decided to remove the steel liner altogether and shrink in an *austenitic* cast ring. At one time a high-nickel ni-resist type of iron was used, with 14 per cent nickel, 6 copper, 2.5 chromium and about 3 carbon. Later, to reduce the amount of nickel needed, high-chromium iron, copper-manganese alloy and other materials were tried.

The ring has ⅛-inch wall thickness and a ground finish. It is about 1-inch deep and is shrunk into the block by the dry ice method. Austenitic structure of the insert provides corrosion resistance, one of the main causes of wear in this region of the bore. It also gives good fits and of course does not grow under repeated heating and cooling. Occasional difficulties developed when structure of the shrunk ring was found to be martensitic.

According to one engineer (not with Ford) that type of cylinder ring is not new, having been used at least 15 years ago on cars abroad. European patents are said to be held by the British on similar inserts, and Campbell, Wyant & Cannon Foundry Co. is reported to hold American patents on a similar idea.

From this it should not be inferred that Ford has abandoned the use of the sheet steel liners. As far as is known, production of liners is continuing at the Rouge plant, although the technical press as yet has not been admitted to inspect the installation. Rather it would suggest that on heavy-duty engines where the concentration of heat at the top point in the cylinder bore is exceptionally severe, liners may not be all that is required. After all, even heat treated sheet steel cannot be considered a heat resistant material. Perhaps the cast austenitic rings, some of which were tried even before the steel liners were introduced, by the way, may prove to be the solution in a part of the Ford engines.

Tapped All Furnaces

Ford foundry was one of the last departments to close in the Ford strike last month. When practically all other departments had been shut down by walkouts, the foundry and motor buildings continued in operation, but within 12 hours they necessarily had to suspend. It is reported that inspection of equipment in the plant after it had been evacuated, showed numerous instances of apparent sabotage. No reports of furnaces freezing up were heard. Most of them were tapped before the walkout, including open-hearth steel furnaces.

As this is written no serious cases of shortages in metals or metal parts have developed to break the intense production rate which the motor industry has maintained since the first of the year. Naturally all engineering departments are working on the problem of substitutions for critical materials, including aluminum, zinc and nickel. Also critical are foundry coke and high-silicon pig iron, at least to some motor companies.

Where substitute specifications have been given to suppliers, it has been found that no change has been necessary as yet and old specifications still are being met. However, with the start of 1942 models this summer, many redesigns and shifts in parts seem certain. It should be pointed out, however, that the situation changes rapidly, overnight in some cases, and what may look critical today may ease up tomorrow. This places a trying burden upon engineering departments and materials supervisors, for they must be ready for anything, except a hold-up to production. For example, a month ago aluminum pistons seemed certain to give way to cast iron for 1942 models, but already some of the motor companies have received indications that supplies of aluminum may be available after all.

Models on Reduced Scale

Introductions of 1942 models probably will be on a somewhat reduced scale from recent years. For one thing, changes in designs will not be important, mainly decorative in character. Moldings and trim will be dropped in the interest of saving on plating and die castings. More companies will offer optional transmission innovations such as the Chrysler fluid drive and the Olds Hydra-Matic, but both of these are now considered by some executives as strictly luxury items, adding to cost and weight and penalizing power by as much as 6 per cent. Packard unveiled its new Clipper model last month and announced it was building 2640 of them in April. Priced at $1375, with 127-inch wheelbase and 125-horsepower motor, the car is produced in one type only and marks a striking departure from the traditional Packard lines.

Saginaw Malleable division of General Motors, under capable direction of W. H. Doerfner, has

(*Concluded on page* 160)

★Level "push lines" of Logan heavy duty Roller Conveyor, and Roller Conveyor Transfer Car make a comparatively simple and easy job of handling 6000 lb. boxes of castings from storage lines to cleaning machine in right foreground.

The parallel conveyor lines in the rear of both these views receive the boxes coming from the foundry and constitute "live storage," permitting a large accumulation on the conveyor.

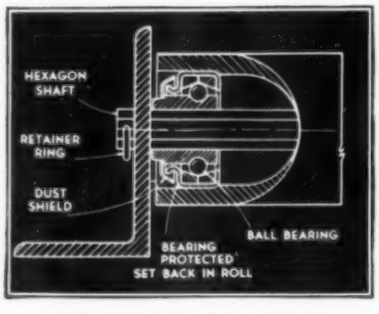
As desired, boxes are transferred, via Transfer Car, to the single line serving receiving table, located adjacent to cleaning machine. Overhead hoist facilitates the dumping of hopper-bottom boxes, and empties are started back toward the foundry over the same conveyor system. The smaller view shows operation of Transfer Car.

in the "SERVICE"

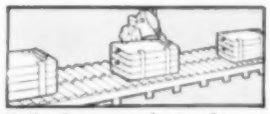
Industry is "in the service now". But the basic problems of the production man, in foundry or shop, remain the same—although brought into sharper focus by the march of current events.

Such Logan Conveyor economies, for instance, as putting *flow* into production, savings in effort, time, space, fair pacemaking, inventory reduction, less damage to molds, better working conditions—these efficiency factors *still occupy* the spotlight with superintendents and foremen.

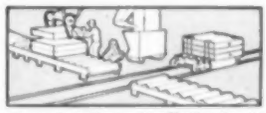
The attaining of such objectives is, in effect, a measure of the *service* which any plant can render—in periods of stress, and in normal times, too. LOGAN CO. Inc., 580 Cabel, Louisville, Ky.



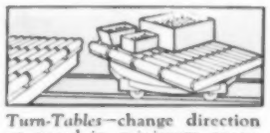
Logan bearings are three-point type. Inner races are broached to hexagon shape for slip fit on shafts.



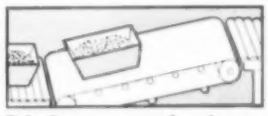
Roller Conveyors—basis of most installations, see many uses shown in Bulletion 15.



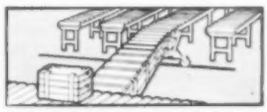
Transfer Cars—for "effortless" transfer of molds or tote pans from one line to another.



Turn-Tables—change direction of travel in minimum space. Molds or tote pans.



Belt Conveyors—used as boosters in roller lines handling tote pans.



Apron Conveyors—used where power conveyor required. Various applications.

Roller Spirals—for "vertical" lowering of tote pans of castings. See Bulletin 15.

Logan Conveyors

NEW EQUIPMENT and Supplies

Grinders

Standard Electrical Tool Co., Cincinnati, has developed a new line of grinding machines which is available with 2, 3 and 5 horsepower motors. Speed of rotation is 1750 revo-

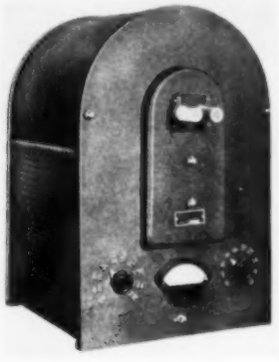
lutions per minute, and is designed for 12-inch and 14-inch diameter grinding wheels. As shown in the accompanying illustration, the heavy duty ball-bearing motor is totally enclosed and operated by a push-button safety starter conveniently located at the front of the pedestal. Safety type hinge-door, wheel guards with exhaust outlets are adjustable to the wear of the grinding wheels. Tool tray with removable water pot is attached to the pedestal.

Automatic Vise

Automatic Vise Sales Co., 2845 Sunset Place, Los Angeles, recently has placed on the market an automatic type vise which may be mounted on a portable stand or attached to a bench. The movable jaw on the new vise slides freely. It is clamped or released through the action of a foot pedal. The main clamping pedal gives sufficient pressure for general work and can be regulated light or heavy. Additional pressure exerted if necessary by a small auxiliary pedal will hold any piece within the capacity of the machine. The two side pedals operate the release. Adjustment of a small screw on the right side of the body sets the tool for repetition and works automatically.

Combustion Furnace

Harry W. Dietert Co., Detroit, is marketing a two-tube combustion furnace in addition to the single tube furnace already on the market. A front view of the furnace in the accompanying illustration shows a switch board on which is mounted the pyrometer meter, electric switch and two selective switches for controlling the proper voltage to maintain any desired temperature up to a maximum of 2750 degrees Fahr. The two tubes are heated uniformly by four Glo-



bar heating elements. All electrical parts are enclosed in a compartment in the lower ventilated portion of the furnace. Thorough insulation is said to prevent excessive heat loss into the room.

Developing Machine

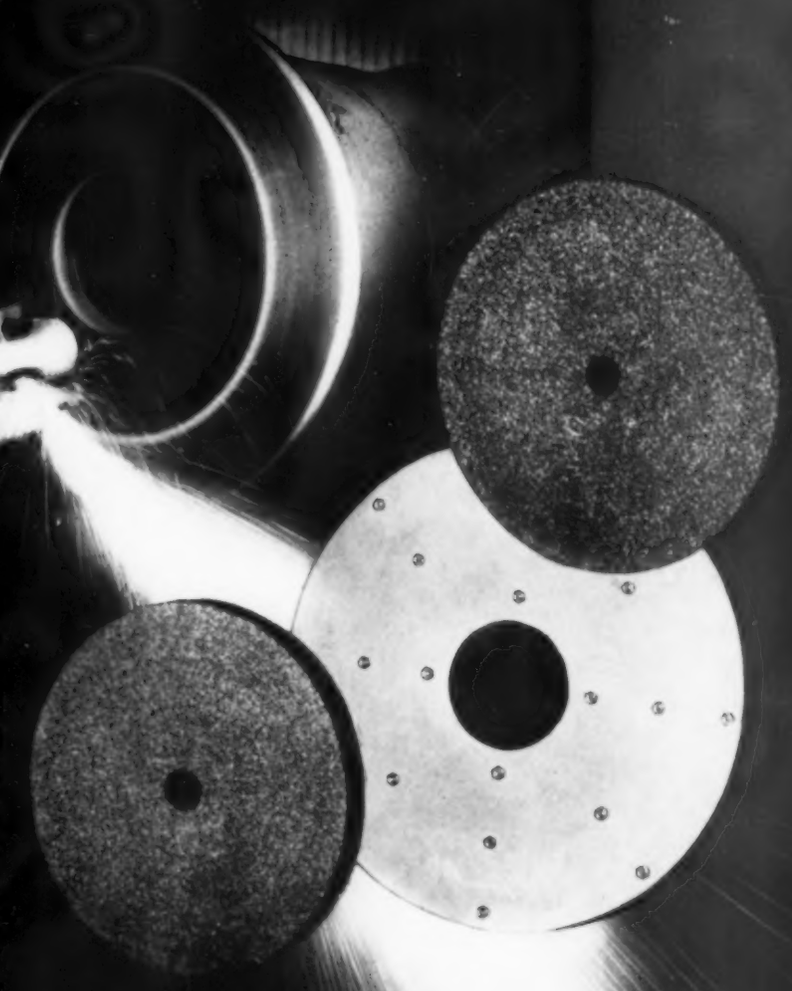
Charles Bruning Co., Inc., New York has made available a new developing machine to be used with one of its printing machines. It is claimed that with this combination one operator performs the entire developing and printing operation with speed and ease. Sensitized paper and tracings are fed into the machine at the front where they are exposed immediately in the printer section. A vacuum separator roll at the discharge point of the printer separates the tracings from the exposed prints and allows the prints to pass automatically to the development and drying sections of the machine. The tracing is returned to the operator, while the completely developed print is delivered flat and dry at the rear of the machine. Fully automatic in operation, the machine consists of a separator roll, a water roll and a series of bands which carry the developed prints through the drying section. The developing section is driven by the printer and is synchronized to operate at speeds up to 25 feet per minute.

Roll Brander

M. E. Cunningham Co., 115-117 East Carson street, Pittsburgh, recently has placed on the market a new floating type roll brander which it is claimed reduces time of marking mill rolls to between 15 and 30 minutes. Roll and roll holder are one-piece construction to eliminate thread or screw failure. Floating type feature is said to allow each piece of type to level itself in the roll without wedging which results in much clearer branding with every character the same depth. Type pressure is on the center line. Type is engraved with back-ground clearance to eliminate chipping of the edges of the characters when the branded roll is put in operation. The steel type is inserted and held in place without spacers which reduces setting up time.

STERLING

THE WHEELS OF INDUSTRY



Sterling Nut Inserted Disc Type Wheels are helping to break foundry production records everywhere . . can do it for you! Available in a wide choice of grains, bonds, and sizes, they will fit the backplates of your present equipment and provide longer, money-making service. Sterling engineers will gladly cooperate in solving your production problems . . write today at no obligation.

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THE WHEELS OF INDUSTRY

New England HOLDS FIFTH REGIONAL CONFERENCE

SHARPLY accelerated activity in the foundry field demanding the personal attention of all those engaged in a managerial or supervisory capacity, cut down the attendance to a marked degree at the fifth New England foundry conference held at the Massachusetts Institute of Technology, Cambridge, Mass., March 28 and 29. The conference was sponsored by New England Foundrymen's Association, Massachusetts Institute of Technology, Connecticut Nonferrous Foundrymen's Association, Connecticut Foundrymen's Association, and the American Foundrymen's Association. Technical sessions were held in Huntington Hall of the institute.

The interesting and well balanced technical program included sessions on job evaluation, aluminum alloys and their casting characteristics, symposium on casting design, surface finish of castings as affected by sand, bronze and nickel alloy castings, and rigging for production.

Following opening remarks by Walter Saunders Jr., past president New England Foundrymen's Association, and James R. Killian Jr., executive assistant to the president, Massachusetts Institute of Technology, the first session featured an address on methods of job evaluation by A. L. Kress, National Metal Trades Association. This session was under the chairmanship of W. W. Rose, executive vice president, Gray Iron Founders' Society Inc., and in tribute to an old and valued former member was dedicated to Luman S. Brown, for many years president of the Springfield Facing Co., Springfield, Mass.

Mr. Kress touched upon existing conditions and the necessity to be prepared for any contingency that may arise from the chaotic conditions prevailing in Europe. In addition to the usual list, management is confronted with many new angles in the field of industrial relations. Government, he pointed out has entered the program to a greater extent than ever before. In former days where establishments were conducted on a rather small scale the

Interesting sessions were held at the New England conference. Photos courtesy C. A. Wyatt, Debevoise-Anderson Co., Boston

president and other high ranking officials knew their employes personally like the members of a family. The intimacy naturally resulted in more harmonious personnel and labor relations.

Under present conditions this intimacy between employer and employe is more difficult and in some instances impossible of attainment. The foreman is the direct connecting link and his importance should be recognized. On the subject of setting wage rates and piece work prices the competent foreman's opinion is an important factor. In a system adopted by his association for setting rates among workmen of varying skill and experience 11 factors are taken into account: Education, experience, physical condition, equipment and process, safety of others, working conditions, mental of visual limitation, hazards, materials, groups and unavoidable accidents.

Pour Metal Into Ingots

With Dr. Robert S. Williams in the chair, P. M. Budge, chief metallurgist, Aluminum Co. of America, Fairfield, Conn., presented a paper on aluminum alloys and their casting characteristics. Lightness is a desirable feature common to all aluminum, alloyed or non-alloyed. The only disadvantage is that this factor of lightness prevents the ready expulsion of gas absorbed in the melting process. Usually it is advisable to melt scrap first and pour it into ingots. The process has to be controlled closely at a temperature between 1300 and 1400 degrees Fahr. Whether melted in a large or small furnace, electric, gas or oil fired or in an iron pot, cleanliness is essential. Pots are washed regularly. Aluminum, especially the silicon-aluminum alloys attack the inside of the iron pot.

In regular foundry melting practice some form of pyrometer is practically essential. Temperature of the metal may vary to a considerable extent without showing any variation in color visible to the naked eye. Thermocouples are immersed in each pot and read either individually or at a central station. Metal should not be allowed to soak. Good practice in pouring includes skimming, prevention of agitation by keeping the lip of the ladle or crucible close to the sprue opening. The speaker discussed in considerable detail the functions of gates and risers, pattern design, position of fillets, flask size and the use of chills and brackets to prevent shrinkage, and cracks. He claimed pin hole porosity usually was caused by faulty melting or pouring practice. Replying to a question by R. F. Harrington, Hunt-Spiller Mfg. Co., Boston, he described the con-

4 WAYS to IMPROVE your ABRASIVE BLAST CLEANING PERFORMANCE

THINK of your blast cleaning machine as a rapid-fire gun for a moment. It shoots thousands of abrasive "bullets" each second. Its effective cleaning action depends upon the quality and quantity of ammunition that can be discharged in a given period of time. If useless fines are permitted to weaken the charge there is bound to be a low score on effective hits—it is going to take longer to reach the objective—and it is going to cost more to do it. By keeping the abrasive clean you can:

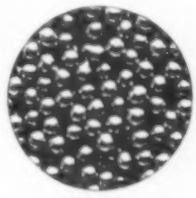

FIG. A

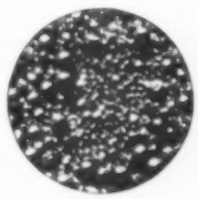

FIG. B

Views showing clean abrasive (Fig. A) and abrasive contaminated with useless fines (Fig. B).

1. **Reduce Cleaning Time** — because there is more real abrasive at work. We have known instances where failure to keep foreign matter out of abrasive increased cleaning time as much as 50%.
2. **Lower Cleaning Costs** because clean abrasive does the job faster.
3. **Improve Cleaning Quality** because clean abrasive has more striking power—it does more effective work.
4. **Reduce Wear On Equipment** because sand wears out equipment much faster than metallic abrasive.

The key to clean abrasive is proper ventilation. Hundreds of foundries have discovered that American Dust Control, (using either the "Dustube" or the "Cyclone") is the profitable solution to this problem because it is extremely efficient, low in cost, and simple to operate and maintain. Get the facts today—we will gladly send you literature and data without obligation.

THE AMERICAN MOLDER

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DUSTUBE DUST COLLECTOR

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CYCLONE DUST COLLECTOR

struction and operation of the large furnaces employed in melting down scrap. A heavy covering of flux prevents the formation of oxides and dross on the bath.

R. F. Harrington presided over a symposium on casting design in which the subject was discussed from various angles by Charles Burkhart, foundry superintendent, Framingham Foundries, Framingham, Mass.; Charles A. McCarthy, superintendent of production, Watertown Arsenal, Watertown, Mass.; and F. H. Van Nest, designing engineer, General Electric Co., Lynn, Mass. Illustrating his comments with free hand blackboard sketches, Mr. Burkhart quoted incidents from his experience in solving a number of foundry problems: Cracked flasks, step pulley, cracked pulley arms, shrinkage in bores of cylinders, couplings and valves.

Replying to several questions the speaker stated that the surface of the chills was blacked and dried. On light castings a chill might be used 15 to 20 times, but he did not favor the use of the same chill more than two or three times on a heavy section. A used chill develops gas and causes trouble. In green sand molds the chills almost invariably will collect moisture if the mold is allowed to stand any length of time.

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can do a better job at less cost with Milwaukee Chaplets and foundry supplies. Today's production calls for Speed and Precision. We're set up to supply your foundry needs — to meet the requirements of Foundrymen who Demand the Best.

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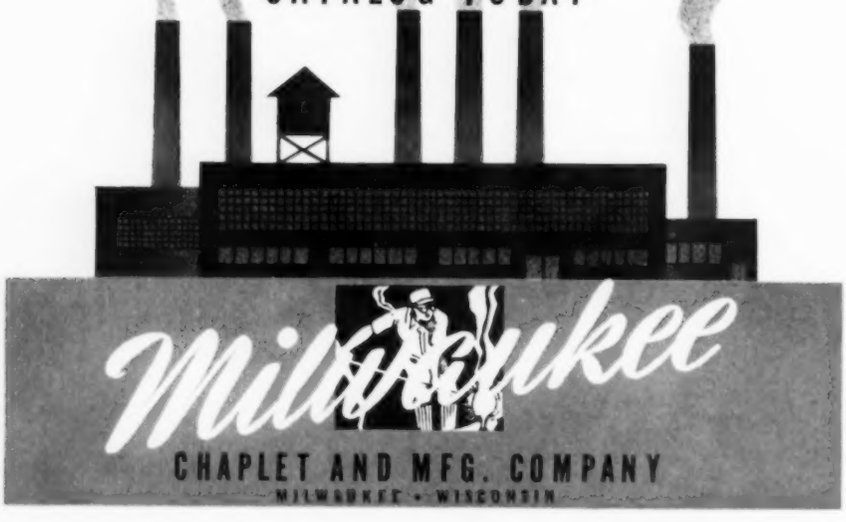

Milwaukee

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Claiming that engineers look forward to a finished job and are not particularly interested in how the results are secured, Mr. McCarthy suggested the advisability of a general conference of all parties involved before the job has reached the drawing room stage. In a general spirit of co-operation, design in many instances may be modified to bring the casting within the range of practical accomplishment without in any manner impairing its utility as originally intended. He discussed tests on aluminum and manganese bronze and referred to growing practice of welding castings to other castings or to structural parts to form complete assemblies. He outlined many commendable features of this trend in engineering design and construction in the foundry field.

Designer Under Pressure

Mr. Van Nest made a plea for more patience with the designing engineer and more particularly with the draftsmen entrusted with the job of converting an intangible idea into a drawing from which a patternmaker can develop an object of three dimensions and from which later the molder can produce a casting. Designer is under constant pressure for speed and economy. He has a wide choice in selection of materials. The foundryman fully aware of the natural laws which govern passage of metal from the liquid to the solid state and the wide range in the rate of cooling between light and heavy sections, naturally prefers simple design and, as nearly as possible, uniform thickness in all parts of the casting. The designer in many instances is not familiar with these limiting factors. The draftsman's intentions are good. He is an earnest, hard working and usually an ambitious individual. However, if he has had no foundry experience he can make considerable trouble for the patternmaker and foundryman.

Donald F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., presided over the morning session Saturday at which W. G. Reichert, metallurgist American Brake Shoe & Foundry Co., Mahwah, N. J., presented a paper on how the surface finish of castings is affected by the sand molds in which the castings are made. A suitable sand imparts a smooth, clean surface and also prevents the formation of scabs, buckles and washes. He considered in detail the main characteristics of sand, permeability, grain size, distribution, bond strength green and dry, moisture content, refractoriness and the behavior of sands at high temperatures.

Records are of major importance to present the facts in any foundry. A permanent record of all test data

should be kept for reference so that casting losses whether attributable to sand, metal, molding or gating may be checked constantly. Plotting daily curves of permeability, strength and moisture against scrap losses caused by sand, blows, cuts, drops, roughness, stickers, etc., have helped considerably in reducing casting losses in many foundries. Metal and molding losses also are classified, shrinkage, cold shuts and slag inclusions. Better results usually are attained where mechanical equipment is available for the preparation and distribution of the sand in a foundry.

Many factors involved in the production of bronze and nickel alloy castings were discussed in a paper presented by Ernest F. Stone, foundry superintendent, Manning, Maxwell & Moore Inc., Bridgeport, Conn., at the session presided over by Walter J. Kenny, North & Judd Mfg. Co., New Britain, Conn. He advocated simplified practice and outlined proper procedure in melting metal in all the recognized melting mediums, effect of reducing and oxidizing atmospheres, typical casting defects and their immediate cause. In the majority of instances a simple covering of charcoal is all that is required and a small addition of silicon-copper serves as an efficient deoxidizer. Commenting on the use of nickel he stated that although the nickel increased the tensile and other properties of certain castings, it was not acceptable to the government inspectors, because nickel was not included in the specifications.

Train the New Men

Raymond Meader, foundry superintendent, Whitin Machine Works, Whitinsville, Mass., presided over the last technical session of the conference at which J. C. Alberts, production manager, Plainville Casting Co., Plainville, Conn., presented a paper on the comprehensive subject of rigging for production. In addition to the general layout, mechanical equipment and processes employed in various types of foundries, the speaker also referred to the many problems involved in recruiting, training and handling the personnel.

The question of flask size is important since it involves the fatigue factor. Following the presentation of the paper an animated discussion covered flask sizes, weight of molds, snap flask versus solid flask and number of patterns in a mold. L. P. Robinson, manager, core oil department, Werner G. Smith Co., Cleveland and for many years prominent in New England foundrymen's affairs, contributed an amusing reminiscence of his reception in a certain foundry several weeks after he had delivered an order of large

The New

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ELECTRIC FURNACE

● **DESIGNED to DEFEND low costs**
Lower carbon pickup.
Low electrode and power usage.

● **ENGINEERS have seen it and are overheard:**
"Neatest design that I ever saw!"—"A very *accurate*, yet *fast* control!"
"See the simple hydraulic electrode operators."
"Look at the low inertia electrode arm counterbalancing!"
"Lower electrical surges—less transformer heating—better plant power factor—better operating load factor!"
"The most important developments in electric furnaces in the past twenty years!"

● **SAFETY MINDED people look and say:**
"Less climbing up on the hot furnace!"
"Lower dust hazard—Keeps melter on the floor!"

● **MELTERS are enthusiastic:**
"No climbing on the furnace among the flames to strain on burnt bolts and no swinging the sledge hammer to clamp electrodes!"
"Electrodes slipped from the floor!"
"Look at the hydraulic control!"
"No steel cable stretch, none to break!"
"Fastest electrodes I ever saw, but good control!"
"Simple isn't it? Can change any part in a few minutes!"
"Blows dust off of the electrodes as they are slipped."
"No troublesome limit switches on the electrode arms."
"Larger roof ring diameters—saves burning out flanges."

● **YOU** will be interested in the new Hydro-Arc, hydraulically operated three phase electric arc melting furnace. This furnace has important new patented features, a lot of common sense and years of good hard experience behind it.

● **WHAT are your electric furnace problems?**

HYDRO-ARC FURNACE CORPORATION
9 SOUTH CLINTON ST. **CHICAGO, ILL., U.S.A.**
Associated with WHITING CORPORATION

flasks.

Entertainment features included a display of modern magic at one of the luncheons contributed through the courtesy of the Mystic Iron Works and a speaker's program following the dinner. N. McL. Sage, director placement officer, division of industrial co-operation, Boston, presented some of the problems involved in the operation of his department. R. E. Kennedy, secretary, A.F.A., Chicago, directed attention to the coming convention of the A.F.A. in New York. G. V. Doherty, Federal Bureau of Investigation, illustrated an able address on the functions and operations of his department, by the case histories of many mysterious crimes.

Committee in charge of the conference included: Chairman, A. S. Wright, Hunt-Spiller Mfg. Corp., South Boston; vice chairman, Walter M. Saunders Jr., metallurgist, Providence, R. I.; James D. Coltman, Bullard Machine Co., Bridgeport, Conn.; Frank Eliott, Westinghouse Electric & Mfg. Co., Springfield, Mass.; E. E. Hall, Saco-Lowell Shops, Biddeford, Me.; Prof. P. E. Kyle, M.I.T.; Prof. J. M. Lessells, M.I.T.; D. Frank O'Connor, Walworth Mfg. Co., South Boston; Howard A. Phelps, Phelps Foundry Co., Ansonia, Conn.; LeRoy M. Sherwin, Brown & Sharpe Mfg. Co., Providence, R. I.; Henry G. Stenberg, Rice, Barton & Fales Co., Worcester, Mass.; Louis G. Tarantino, Connecticut Nonferrous Foundrymen's Association, Bridgeport, Conn.; Charles O. Butler, Warren Pipe Co., Everett, Mass.

Co-operating organizations included American Institute of Mining and Metallurgical Engineers; American Society of Mechanical Engineers; American Society for Metals; American Welding society.

30-day Delivery
on
Overhead Cranes

(SLIGHTLY LONGER ON CERTAIN TYPES)

● We can give what amounts to immediate delivery on hand-operated, overhead cranes up to 10 ton capacities. Delivery on floor-controlled, electric-operated overhead cranes and special types from 45 days to 8 or 10 weeks, depending upon specifications.

Delivery on Jib and Gantry Cranes (capacity up to 3 tons)—30 days or less.

Write or wire your specifications, we're working day and night—are geared up to make delivery promises—and keep them.

C. C. Simmerschuidt

PRESIDENT

CHICAGO TRAMRAIL CO.

CRANES • HOISTS • MONORAILS

Specializing in Service to Foundries Throughout the Middle West

2910 CARROLL AVE. CHICAGO, ILL.

Adventures of Bill

(*Concluded from page* 108)

methods and rigging to meet emergency conditions we have had many interesting, many remarkable and many amusing experiences. Some time when I get around to it—this is the longest letter I have written in 2 years, or maybe 3—well anyway some time I'll tell you about the winter we was snowed in and had to make some coke in an old core oven. Pretty bum stuff, but I think we should get a medal or something for ambitious effort.

"There y'are," said Bill, "the old boy seems to have hit some of the high spots while bouncing around from peak to peak and from precipice to precipice like one of them there billy goats or mountain sheep we see in the pictures every now and again. What do you think of his stories?"

"Well," I admitted cautiously, "they are extraordinary, but basing my opinion on the craft in general, you will hear others to match them when you get into a huddle with some of the old cronies at the New York convention."

"Nothing extraordinary about 'em," said Bill, "with possibly one exception. Every hobo that rode the rods from coast to coast and from the Great Lakes to the Gulf has had the same or somewhat similar experiences at one time or another. However, the little old time foundries lacking in nearly everything necessary, and the jolly, carefree, skilful and highly ingenious lads who produced castings under conditions comparable to that of the Israelites trying to make bricks without straw for the cruel Egyptian task masters, are all gone with the wind. I wonder how the snowed in lad made coke in a core oven?"

"Toss it into the foundry agenda," I suggested. "It won't be any worse than some of the questions that are asked."

Division of Labor Standards, Department of Labor, Washington, recently has issued two booklets entitled "The Worker's Safety and National Defense," and "Conserving Manpower in Defense Industries."

DEFENSE TO KEYNOTE CONVENTION

(*Concluded from page* 69)

Lester N. Shannon, and the annual awards address of the association by S. Wells Utley, Detroit Steel Castings Co., Detroit, and a past president and honorary member of the American Foundrymen's Association. Other features of special interest are the chapter delegate conference on Monday afternoon, the chapter officers and the engineering instructors dinners on Monday evening, the apprentice supervisors dinner Tuesday evening, and the annual A.F.A. dinner on Wednesday evening, as previously described.

During the convention, the castings and patterns entered in the Annual A.F.A. Contest will be on display on the mezzanine floor of the Hotel Pennsylvania.

The ladies entertainment program as tentatively arranged by the New York committee is as follows:

Monday, May 12

9:00 a. m.—Registration, Conference Room 2, Hotel Pennsylvania.
2:00 p. m.—"Fashion Do's and Don'ts," by Charlotte Wilkinson, fashion director, R. H. Macy & Co., Roof Garden, Hotel Pennsylvania.
3:00 p. m.—Tea, Roof Garden, Hotel Pennsylvania.
Evening—Optional with complimentary tickets available for the following programs at N.B.C. studios or Columbia Broadcasting studios: 7:00 p. m.—Fred Waring; 8:30 p. m.—Voice of Firestone; 10:00 p.m.—Guy Lombardo; 11:00 p. m. —Fred Waring (rebroadcast).

Tuesday, May 13

9:30 a. m.—Gray Line Tour—Lower Manhattan (or specially arranged tour).
11:30 a. m.—Luncheon—Fraunces Tavern —Where George Washington bid farewell to his officers on Dec. 4, 1783.
12:30 p. m.—Visit to museum of George Washington relics and revolutionary period in same building.
1:15 p. m.—New York Stock exchange.
2:30 p. m.—Boat trip around Manhattan Island. (An ideal way to see New York).
Evening—Optional. Suggest theatre or Radio City music hall.

Wednesday, May 14

Group A

9:30 a. m.—N.B.C. Studio tour.
11:30 a.m.—Helena Rubinstein salon.

Group B

9:30 a. m.—Helena Rubinstein salon.
10:45 a. m.—N.B.C. Studio tour.

Groups A and B

12:00 m.—Luncheon—Longchamps.
Afternoon—Optional. Suggest theatre matinee, Music Hall, Television tour, Rockefeller Center, or shopping.
7:00 p. m.—Annual banquet.

Thursday, May 15

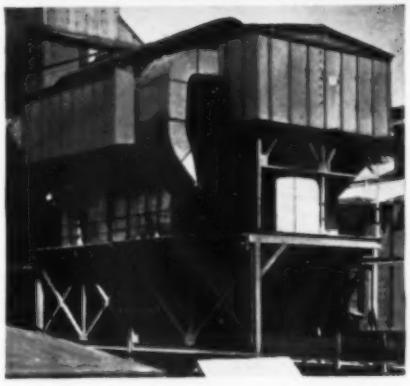
10:30 a. m.—Tour through kitchens of Hotel Pennsylvania. (World's outstanding hotel kitchens).
10:30 a. m.—Visit Gimbel Bros. Exhibition and sale of works of art from William Randolph Hearst collection.
Afternoon—Optional. Suggest visit to: LaGuardia Airport; Museum of Modern Art; Metropolitan Museum of Art; Empire State building; Little Church around the Corner; St. Patrick's cathedral; American Museum of Natural History; Aquarium; Statue of Liberty. (Miss Brennan at the information desk will give explicit directions to reach these points).

Clean Abrasive To Get Better Results

To get peak metal cleaning efficiency from abrasive blast cleaning equipment, both air and airless blasting machines, the abrasive must be kept clean. Molding sand scale and broken down fines retard the cleaning action of metallic abrasive and greatly increase the rate of wear on the blasting machine. It is not unusual to discover instances where failure to keep such foreign material out of the abrasive resulted in as much as a 50 per cent lower cleaning speed, to say nothing of the increased wear on parts and a less perfect cleaning job.

Exhaust requirements for efficient operation of blasting equipment have been determined definitely for all classes of service. A ventilating and dust collecting system of adequate capacity and proper de-

Results...
THE BEST RECOMMENDATION FOR PARSONS
DUST ARRESTORS-BLAST ROOMS



TO MAKE A SOUND INVESTMENT DOUBLY SURE, BUY EQUIPMENT THAT IS CREATED AND BUILT BY PARSONS . . MANY LEADING FOUNDRIES SWEAR BY PARSONS ACHIEVEMENTS.

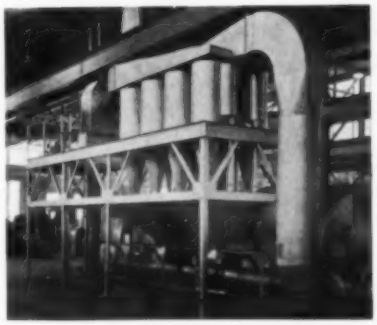
PARSONS OVAL BAG DUST ARRESTORS

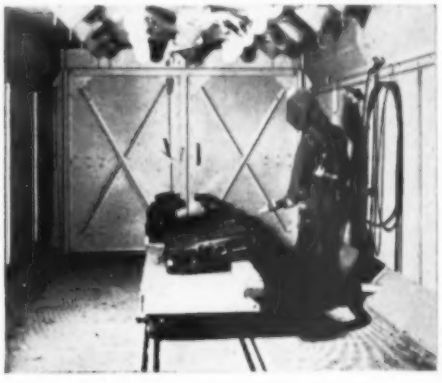
The Oval Bags stay "new" in filtering capacity because they WILL NOT PLUG even when handling dust from moist materials. AND THEY LAST for an average of more than ten years. Write for Bulletin DA-6.

• • •

PARSONS BLAST CLEANING ROOMS

The last word in modern blast-cleaning room construction. Scientific ventilation and illumination make for excellent working conditions—and maximum production. Write for New Bulletin.





ALL-METAL PARCLONE CENTRIFUGALS

Eliminates dust from shakeouts and sand handling systems. Collection efficiency runs to 98%. Uses no filters, no water and is built to LAST. Write for full particulars.

Built by
PARSONS ENGINEERING CORP.
CLEVELAND, OHIO

THE NAME PLATE THAT MEANS QUALITY
PARSONS
PARSONS ENGINEERING CORPORATION CLEVELAND

sign will keep equipment up to maximum cleaning efficiency if the system is inspected regularly to see that it is operating as recommended.

Recommendations given are based upon results obtained from operation of airless blast equipment made by the American Foundry Equipment Co., Mishawaka, Ind., but they will hold true for all types of blasting machines. A few of the points that should be considered in handling the periodic checking routine, because they are quite often overlooked follow:

Do not allow the dust collector to become overloaded with dust—shake the tubes when needed. By watching the permanent manometer which is connected across the dust collector, proper time for operating the shaking device can be determined. Hoppers should be emptied daily. Check the condition of the tubes in the dust collector regularly to be sure that they are not torn or damaged.

Check the vent piping at intervals, especially the horizontal pipe section to make sure that deposits of dust have not accumulated through a drop in air velocity. After the ventilation has been balanced properly allow no one to tamper with the blast gates except those having authority to make adjustments. Check the belt on the suction fan occasionally to make sure there is no slippage. Be sure the fan is operating at the correct speed and in the right direction.

If the blast cleaning equipment is equipped with an abrasive separator, check it regularly, preferably once a day. The discharge orifice should be adjusted to provide as even a flow of dirty abrasive over the shed plate as possible and make sure that no foreign material has caught in the slot. Also check the orifice to see that wires or refuse are not retarding the flow of abrasive through the separator. Be sure that all cover plates and inspection doors are in place, particularly those on the abrasive separator, elevator head, and on the dust collector, otherwise air will be permitted to by-pass through these openings and seriously affect the efficiency of the dust collecting equipment.

CORE-MOLD SPRAYER

10 CORES SPRAYED—WHILE ONE IS BEING BRUSHED!

. . . AND CORES ARE SMOOTHER

GREEN CORES ARE SPRAYED AS EASILY AS BAKED CORES

During application, the blacking material is being
CONSTANTLY AGITATED

DEEPER PENETRATION, THEREFORE
NO FLAKING OR WASHING

Send for descriptive literature

THE FREEMAN SUPPLY CO.

Pattern Shop and Foundry Supplies and Equipment
Mahogany and Pine Pattern Lumber

1152 EAST BROADWAY **TOLEDO, OHIO**

Among Detroit Foundries

(*Concluded from page* 150)

launched a three-year expansion and modernization program which will lift daily iron-pouring capacity from 1000 to 1400 tons. Addition to the present plant will house two new cupolas and an electric furnace. The entire plant is to be rezoned as to manufacturing operations, and its conveyor systems shifted to provide more effective continuity production, as well as to improve working conditions.

Other equipment to be purchased includes a 30-ton annealing furnace, two draw furnaces, and cleaning and processing equipment. When completed, the program will necessitate hiring about 200 additional men. Saginaw Malleable has been experimenting with production of a light armor plate castings. No reports of how far this work has progressed are available.

Centrifuse Corp., Lansing, Mich., is experimenting with centrifugal casting of airplane wheel brake drums, spinning a duplexed alloy iron on the inside of a heavy-gage steel backing. These drums are subjected to severe service, far beyond that which automotive drums encounter, and the problems of scoring and heat checking are troublesome though not insurmountable.

Wilson Foundry & Machine Co. at Pontiac, Mich., is in production on some tank castings and also is supplying engine blocks and other castings for the 4-cylinder jeeps or blitz buggies being built for the army by American Bantam, Willys and Ford.

AFFECTS NONFERROUS FOUNDRY

(*Concluded from page* 95)

field are followed closely. Discussion of that family of alloys is a part of the program of meetings throughout the country and will continue to be so.

It is difficult to predict the extent of changes in practice that will be necessary in adapting the industry to available materials. However, there is no doubt that the increasing attention being given to the economic side of practice in the matter of losses and salvage will result in a healthy overhauling of the whole scheme. The specification consciousness now so widespread in the industry as a result of heavy production of goods subject to rigid chemical and physical test for approval has the effect of generally elevating the normal practice on all work. With the prospective lend-lease load and the undoubted necessity of apportioning the work over all foundries, large and small, with the resultant setting up universally of the type of practice needed to operate successfully, the elevation of the general standard of quality of part must follow. This can result in nothing other than advance and progress.

Develop New Alloys

Progress continues in the nonferrous field in development of new alloys and exploitation of those already in wide use. Heat treatment of copper-base alloys of the hardenable type is supplying properties unknown in the nonferrous casting field until recent years. Application of these materials supplant, in many cases, parts formerly processed by other means than casting. Composition of these families of alloys is extremely critical and close control is necessary in their handling. The machine tool shortage adds further interest to the precision casting in media other than sand of nonferrous materials. Remarkable progress in the higher strength alloys is being made in this field. On the other hand, the plastic industry is encroaching to some degree on the industry, particularly in the light alloy field.

There does not appear, from information available, to be any marked change in composition of part in castings now being produced by the countries at war. The trend away from the so-called strategic metals, tin, aluminum, zinc, magnesium and nickel is not marked. The activity in the light alloys is due, evidently, more to extended application than to substitution. There is evidence of substitution of cast parts, in some instances, for parts formed by other means, particularly in aircraft engine parts and in machine work. This may be due to two factors— (a) improved strength in *as cast* condition, and (b) to overload in machine tool set ups.

Bulletin Describes Subcontracting

Farming Out Methods, fifth in a series of farming out bulletins prepared by the Labor Division of the Office of Production Management, was issued recently. The series is designed to speed up defense production by describing practical methods by which idle machinery and idle skilled workers may be brought together, in co-operation with the program carried out by the Defense Contract Service.

New bulletin contains information for government purchasing agents, prime contractors, subcontractors, and community defense organizations, concerning successful farming out techniques now being practiced by various private companies, and the pooling of resources by local, regional and labor-management groups.

WHAT PRICE Legs?

$5 — $500 — $5000?

It may be hard to place a value on legs but it isn't hard to protect them.

"FRANK" FOUNDRY LEGGINGS

have been protecting thousands of workmen in hundreds of foundries for the past 17 years.

Made in a style and material to meet every requirement—

20 STYLES—Hip—Knee Length—Spats.
3 MATERIALS—Chrome Leather—Fireproofed Duck—Asbestos

If your workmen are not now enjoying the fullest leg protection write at once for complete information and prices.

SAFETY Clothing and Equipment CO.
7016 EUCLID AVENUE · CLEVELAND, OHIO
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Obituary

GEORGE B. PICKOP, 66, founder and president New Haven Vibrator Co., New Haven, Conn., died at Daytona Beach, Fla., March 28. He was born Dec. 6, 1875, in Terryville, Conn., and attended schools in Terryville, Springfield, Mass., and Hartford, Conn. After taking an engineering course in Hillyer Institute, Hartford, he joined the engineering department of the Pope Mfg. Co., at that time engaged in the production of sewing machines and high bicycles. In 1895 Mr. Pickop was employed by the P. & F. Corbin plant of the American Hardware Co., New Britain, where he remained until 1912 and became interested in foundry operations. Here he began the long series of inventions which marked his progress in after years. His first foundry vibrator was developed in 1900. In 1912 he opened a consulting office in Hartford and two years later moved to New Haven. He joined the Malleable Iron Fittings Co., Branford, Conn., in 1915 in a supervising and engineering capacity and the company took over the manufacture and sale of his vibrators. In 1925 he organized the New Haven Vibrator Co., and established a plant for the manufacture of vibrating equipment and other devices of his inventive genius.

* * *

Josiah C. Fleming, president of the Detroit Hoist & Machine Co., Detroit, died recently.

* * *

George H. Uhlmeyer, 75, retired chief engineer, John Deere Harvester Works, East Moline, Ill, died March 7 at his home in Rock Island, Ill.

* * *

William G. Burgess, 84, superintendent of the pattern department, Industrial Brownhoist Corp., Cleveland, before his retirement in the early 1930's, died Feb. 26 at his home in that city.

* * *

Edward P. Rothacker, 79, founder and owner of the Rothacker Foundry Supply Co., Cleveland, died in that city Feb. 21. Mr. Rothacker was the inventor of several foundry equipment accessories.

* * *

Bert Ross Hartwell, 51, assistant secretary and treasurer, Teleweld Inc., Chicago, manufacturer of portable brinell hardness testers, died Feb. 4 in the Evanston, Ill. hospital after a brief illness.

* * *

Michael Ganley, one of the organizers in 1893 of the Connersville Blower Co., Connersville, Ind., and superintendent of the foundry department until his retirement, died recently in Connersville.

* * *

Fred R. Donaldson, 64, vice president and sales manager, and one of the founders of the Machined Steel Casting Co., Alliance, O., died Feb. 22 at his home in that city. Mr. Donaldson was a native of New Brighton, Pa.

* * *

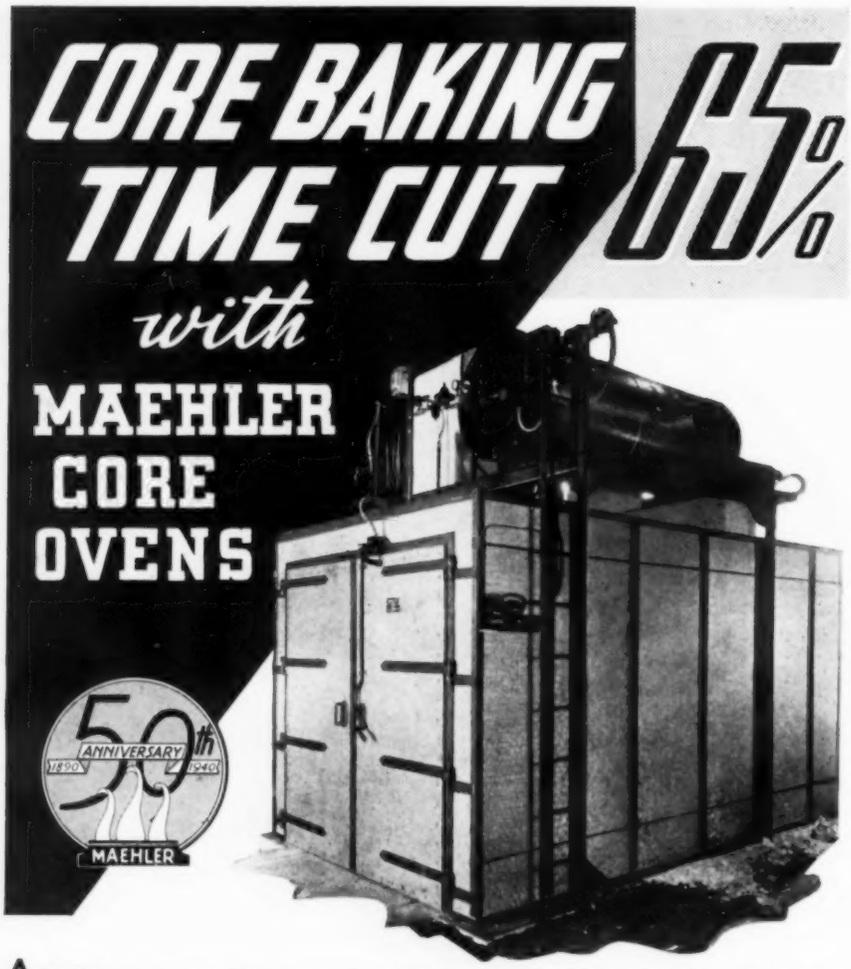
John Monighan, 88, pioneer Chicago manufacturer, died at his home in that city, March 24. In 1884 he established the Monighan Machine Co., now the Bucyrus-Monighan Co., a division of the Bucyrus-Erie Co.

* * *

Frank J. Garrett, 55, secretary and general manager, Briggs & Turivas, Chicago, iron and steel scrap interest, died recently of a heart attack. He had been associated with the company 25 years, and had occupied his present post for 9 years.

* * *

A. J. Lindemann, 86, a director and former president and chairman of the board, A. J. Lindemann & Hoverson Co., Milwaukee, died recently in that city. Up to 3 years ago, Mr. Lindemann was chairman of the board of the stove manufacturing company which he helped to found in 1875. He then retired but continued as a member of the board



AFTER one month's operation of a new Maehler Air Heat Oven at the Blackmer Pump Co., Grand Rapids, Mich., operating records proved conclusively that baking time for small cores had been reduced 65% and baking time for large cores had been reduced 30% as compared with the time required with old equipment!

Maehler Recirculating Air Heat Ovens and Maehler Conversion Units for old ovens invariably bring great savings to foundries through reduction in baking time, improved core quality, lower fuel costs and the elimination of smoky working conditions.

Is it feasible for you to continue to operate obsolete core baking equipment that hampers production and fails to earn a reasonable profit? Especially now when demands for castings are increasing daily?

Take advantage of what modern Maehler Ovens offer you.
Write to Maehler today.

THE PAUL MAEHLER COMPANY, 2200 W. Lake St., Chicago, Ill.

in an advisory capacity. He invented the combination coal or wood and gas range, and an automatic oil burner.

* * *

Cecil Swan, 60, vice president in charge of sales, Detroit Lubricator Co., Detroit, died March 23 in that city after a brief illness. Mr. Swan formerly had been associated with the American Radiator Co. and Standard Sanitary Mfg. Co.

* * *

John Spousta, 60, owner of the Advance Castings Co., St. Johns, Mich., died recently in that city. Mr. Spousta came to St. Johns in 1913 and purchased the foundry which he later sold but repurchased in 1934.

* * *

Henderson Montgomery Green, 67, first vice president, Raybestos Manhattan Inc., died recently at his home in Montclair, N. J. Mr. Green was vice president of Manhattan Rubber Co. when that firm and others merged with the Raybestos company in 1929. He had been with the first company for more than 20 years.

* * *

James H. Vanpelt, 58, founder and owner of the Owosso Bronze Bearing Co., Owosso, Mich., died recently. He had been in ill health for some time. Mr. Vanpelt formerly was superintendent of Buick No. 1 plant at Flint, going there from Elmira, N. Y., where he had aided Glenn Custis, pioneer aviator build his first plant at Hammondsport, N. Y. He went to Owosso in 1918 and organized the bronze bearing company.

* * *

Earl C. Carr, 50, a director, American Stove Co., Cleveland, and manager of its Federal Foundry division, Indianapolis, died March 9 in Indianapolis. Mr. Carr began his career with the Best Foundry Co., an affiliate of American Stove, Bedford, O. He was promoted to office manager by 1914 and transferred to Indianapolis, when the stove company established the Federal Foundry division there. He had been a director of American Stove since 1931.

* * *

John T. Ryan, 57, president, Mine Safety Appliances Co., Pittsburgh, died Feb. 20 in Miami, Fla. Mr. Ryan was a native of Huntingdon county, Pennsylvania. He attended Juniata College and Pennsylvania State College from which he graduated in 1908 with a bachelor of science degree in mining engineering. In 1934 he was given the degree of honorary engineer of mines by the same institution. During his entire business life he was actively identified with the mining industry. In 1914 seeing the need for more adequate safety equipment, he and George H. Deike, Pittsburgh, founded the Mine Safety Appliances Co., manufacturer of mining and industrial safety equipment.

* * *

Addis E. McKinstry, 71, former president, International Harvester Co., Chicago, died at his home in Hinsdale, Ill., March 21. He had been in ill health the past 6 years. Mr. McKinstry started to work at 16 with the old Deering Harvester Co. in Mansfield, O., and in 1902, when the Deering company was merged with the McCormick Harvesting Machinery Co., he became district sales manager for eastern United States and Canada. Mr. McKinstry was successively in charge of Canadian sales for the company; superintendent of the company's new plant in Hamilton, Ont., in 1907; works manager of all the company's plants in Canada and the East; and in charge of engineering development of new implements, and supervisor of the company's purchasing and traffic. In 1919, he was elected a vice president of the International company in charge of sales and collections. Six years later he became a director. He was elected president of the company after the death of Alexander Legge

As the Convention rolls around again the CLEARFIELD MIXER greets its old friends and a whole host of new ones made since the Chicago Show last year.

Built in a complete range of sizes, CLEARFIELDS are going into the Nation's industries in constantly increasing numbers.

Yours for better sand.

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.

in 1933. Since his resignation in 1935, he had served as chairman of the executive comittee and as a member of the board of directors. Mr. McKinstry was active for many years in the Farm Equipment Institute, serving as president in 1929-30.

* * *

John Mueller, 73, president of the Brookside Brass Foundry & Mfg. Co., Cleveland, died April 14 at his home in that city after a 2-month illness. Mr. Mueller was born in Hanover, Germany, and came to this country in 1883. He founded the Brookside Brass Foundry company in 1901, and has been president since.

Book Review

The Bottlenecks of Business, by Thurman W. Arnold, 335 pages, published by Reynal & Hitchcock, Inc., 386 Fourth avenue, New York, price $2.50.

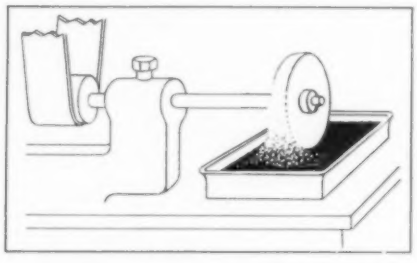
With the increase in the prosecutions of monopolies by the government, the field of business should be interested in the economic philosophy of the active head of these actions. This book provides background thinking of the author, the Assistant Attorney General of the United States, and presents an enlightening analysis of some of the principal cases involved.

The discussion first treats with the basic problem of distribution, and then considers in turn the following subjects: How restraints of trade affect the standard of living, how restraints of trade unbalance the national budget, a free market in time of national emergency, an elastic procedure backed by tradition to prevent private seizure of industrial power, procedure under the Sherman act, antitrust enforcement for the benefit of the consumer, bottlenecks between the farm and table, the rise of the consumer movement.

Water Pan Catches Grinder Dust

By A. H. Waychoff

Where small objects are ground or polished on wheels with no suction fan equipment, the dust can be eliminated by setting a shallow tray filled with water as close as possible to the under side of the wheel as shown in the accompanying illustration. Only a small amount of water is needed. An ordinary cake



Water pan under the wheel catches practically all the dust

or bread pan, 1-inch or more in depth will serve satisfactorily. Dust from the wheel is thrown into the water by centrifugal force and will not follow the air current made by the spinning wheel.

Whiting Corp., Harvey, Ill., is discontinuing manufacture of industrial and domestic coal stokers, to concentrate and expand its production of foundry equipment, cranes, pulverizers, evaporators and heavy machinery. Eddy Stoker Corp., 4717 West North street, Chicago, will take over the manufacture of Whiting's stoker line and is contemplating an expansion program to handle it. A new company, the Whiting Stoker Co., has been formed to act in a sales capacity for the Whiting stokers. George W. Graham, president of the Eddy company, also heads the new sales organization.

Whiting Corp. recently completed construction of a structural shop addition, 81 x 325 feet, at a cost of over $100,000, to accommodate its rapidly expanding business.

JUST PLAIN WATER, BROTHERS,

that's all you add to

McCormick Bonded
VULCAN BLACKING

The bonds are complete for the entire range of temperature . . . The casting finish tells the story . . . It is ideal for dry sand cores and molds.

Manufactured only by

J. S. McCORMICK CO.
PITTSBURGH, PA.
FOUNDRY FACINGS • SUPPLIES • EQUIPMENT

GRAY IRON CAN SERVE EFFECTIVELY

(*Continued from page* 89)

used in many places where knowledge of impact resistance is important."

A number of impact tests are given in that text which are only comparative as far as resistance of various classes of cast irons is concerned. They are not directly comparable to tests with which the design engineer is familiar, and do not greatly strengthen the implications of the author.

Even so recent and technical a text as *Practical Metallurgy* by Sachs and Van Horn—1940, refers to gray cast iron as "generally rather brittle." The examples quoted are but a few among many, and are not particularly "horrible" examples which might be cited.

Poor Grades Fail

The A.S.M.E. Boiler Code and also the Amended Rules and Regulations of Steamboat Inspection Service hold cast irons for pressure containing parts to temperatures not exceeding 450 degrees Fahr. The origin of that limitation goes back about 30 years. At that time some irons had been used successfully at 600 degrees Fahr., but some poor grades had failed at temperatures somewhat over 450 degrees Fahr. Today it is known that 450 degrees Fahr. is liberal for weak open grained irons, but better classes now available indicate that the blanket ruling may be unduly restrictive for those classes.

It is not an object of this article to multiply examples. Rather, it is to question what iron foundrymen in general are going to do to promote sound usage of their product in these critical times. A few years—yes, even a few months ago—such promotion usually meant competition with other ferrous and nonferrous castings, wrought metals, weld fabricated structures, etc. Today manufacturers of those materials usually have plenty to do in getting out production and less time to look into border line competitive markets.

Availability is a big factor to the consumer. Take the case of automotive pistons. There are certain advantages to aluminum alloys, including less weight of moving parts, ease in finishing and better heat conductivity. These offset the undesired expansion characteristics of the metal (which were compensated effectively by design anyhow) and the higher cost of the metal per pound. Today it appears that pistons will have to be made of cast iron, and improvements in finish and other changes will have to be made.

Recently the British are reported to be preparing to add another and higher strength class to their high duty gray iron specification BS786 (1938), also to add another test bar size, 0.6-inch diameter to the 0.875, 1.2, 1.6 and 2.1-inch bars already available. From the same sources it is stated relative to a War Emergency Revision proposal that "representations have been received from The Ministry of Supply that Cast Iron should be substituted for Cast Steel wherever it is practicable. . . . ."

In an emergency many prejudices and preferences must be thrown overboard. Let it be assumed for the moment, that the present emergency may bring about considerably more widespread use of cast iron as a substitute for other metals. It would be short-sighted indeed merely to accept any such changes as acts of Providence and let it go at that. Unless foundrymen are alert to the possibilities, more ultimate harm than good may come of such substitutions.

Cast iron is no single metal or alloy. The term is generic. There are many classes of cast iron, and

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it is imperative that the right class be used for each specific job, and that wherever necessary, designs be changed to permit safe and sound utilization. All metals and alloys, cast and wrought, have their peculiarities and shortcomings. Cast iron is no exception.

It is recognized that cast iron is available over a wide range of tensile strengths; the A.S.T.M.-A48 specifications providing classes from 20,000 to 60,000 pounds per square inch minimum tensile strengths. Each class has its functions, and within a given class, controls and modifications may be desired to adapt it to the particular design and condition of service contemplated. As is well known to foundrymen, a given cast iron varies in strength according to rate of cooling (or section size). An indication of this is given in the A.S.T.M.-A48 specification which provides three different bar sizes to represent various controlling castings sections. Where varied sections are involved, low total carbon content and also the use of certain alloys are helpful.

In this connection there is at the time this is written some difficulty in getting alloys. There is no predicting precisely how far and exactly in what direction restrictions in alloy usage may go. Both to make best use of alloys, and in the event of restrictions, to do the best possible without all that might be desired, more attention to the fundamental metallurgy of non-alloyed irons will be found most helpful. The most value from alloy usage comes only if those are used in suitable base irons.

The excellent non-seizing properties of properly made gray iron in metal-to-metal wear, and for certain applications the use of flame hardened and also chilled faces are recognized. Damping properties are unique. Cast iron is relatively notch insensitive. It is rather high in compressive strength. In cross bending, modulus of rupture exceeds the tensile strength. Gray iron casts well, and is made sound with less precautions than are needed for most metals—an advantage that should not be invoked too liberally!

Not a Ductile Metal

Most condemnations of cast iron come because of its alleged brittleness. It is true that cast iron is not a truly ductile metal, but the implication of fragility that the term brittleness connotes is not deserved. Engineers are "ductility conscious." Reference should be made to the common sense discussion of H. W. Gillett in *Proceedings* of the A.S.T.M. Vol. 40, 1940 on "The Limited Significance of the Ductility Features of the Tension Test." While gray iron's alleged brittleness is under undue suspicion in many quarters, a swing too far the other way would not be to the ultimate advantage of the foundry industry.

Although restrictions on alloy usage may close the door to such developments, certain of the high alloy austenitic irons have a useful range of corrosion resistance. In a number of places they are worthy substitutes for some other alloys. These irons are specialties and their successful manufacture involves practices peculiar to themselves. They are not (for quality works) adapted too readily to methods of manufacture suitable for most straight gray and low alloy gray irons.

Whatever advance may be made in the use of cast iron as an engineering material substitute for other alloys depends on getting cast iron of the proper class and properties into consumer specifications.

There is said to be considerable antipathy on the part of many foundrymen toward specifications. It is true that there are many specifications and that some of them contain either ambiguous or unduly restrictive provisions. Some appear to have been drawn by consumers with but slight consideration of the producers' problem. Whose fault

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is this presumably undesirable condition? Does it not reflect in large degree on the foundry industry itself?

In the first place specifications calling for "good quality cast iron", for "high grade semi steel" etc. surely do not dignify cast iron, or promote it as a worthy engineering material. In the second place are there not many firms running (or having run) only a few meager control tests, with little or no technical supervision or research on the engineering properties of their metal? Data based on such an infirm and shaky foundation is not sound and may lead to considerable damage to the industry.

Is it not true that competing metals, cast and wrought, are backed by groups which conduct extensive research, which as industries and large groups within industry advertise the engineering merits of their products, and which take an intensive interest in and follow in detail the formulation of specifications? The stock answer to this is that many foundries can't afford it. Actually they cannot afford to be without it. This is a technological age, and war today is a highly developed engineering undertaking. To participate in the advantages of the one, or to be of service in the other, it is necessary to participate in the efforts which lie at the foundation of the activities and specification formulation is not the least of these.

Make Specifications

The American Society for Testing Materials is the leading consumer-producer specification making body. Its specifications are in general sound and most carefully drawn, for both ferrous and nonferrous metals (and many non-metals) and represent the best judgment of the balanced group of consumers and producers there represented. Quite frequently its specifications are used as bases for consumer specifications, both by large consumer groups and by individual consumers.

The list of members of Committee A-3 on Cast Iron, 1940 *Yearbook* shows total members are 108, of whom 46 are listed as consumers, 36 as general interest and 26 as producers. Of the 26 producers about 9 are what we may call general castings foundries; foundries which sell castings as such to the trade primarily to customers' specifications and patterns. A number of "*captive*" foundries are represented, which are interested in specifications to be applied to their castings, component parts of their product. These do not sell castings as such; they use castings of their own manufacture.

Formulation of specifications costs money. Expense of society membership is the least cost although it is the primary and foundation necessity for the existence, publications, etc. of a society. To that extent there is a return to the members of information received in publications. Actual participation in specification formulation involves belonging to subcommittees, attending meetings, and conducting correspondence, which is relatively expensive. When as is often the case, experimentation and research are required to get sound factual bases for test methods, classifications, etc. that may be taken on either by a number of individuals or may be and is in some committees, supported by contributions from the industry.

If cast iron is to get full consideration in this emergency — or at any time—it will come only through educating the consumer to specify the right classes or grades for the application. To do this soundly it is up to all individuals concerned to have above all a constructive and co-operative attitude toward the problems enumerated.

This joint commentary by the authors is in response to a request of the editor of THE FOUNDRY, for a brief discussion of the possibilities of gray iron in the defense program.

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MALLEABLE UTILIZED IN DEFENSE

(*Continued from page* 91)

umn of those cars in an advance. In their construction, the front axle differential assembly, housed and supported by the malleable iron carrier which contains a differential case and two bearing caps also of malleable iron is used. A similar assembly is in the rear axle, and other malleable parts, including the steering gear housing, windshield brackets and spring bumper mountings, are likewise used to advantage. Many of those castings are shown in Fig. 2.

Not only in the reconnaissance-combat cars, but also in the army trucks malleable iron castings go into service. The army needs many thousands of these trucks and needs them in a hurry. Already thousands similar to the one shown in Fig. 4 have been built and more are in process.

In the illustration, the truck is "ploughing through" where the going is tough. A four-wheel drive is used and tough malleable iron castings are employed in both front and rear axle differential assemblies. Fig. 3 shows steering mechanism and brake and clutch control parts made of malleable cast iron.

Illustrative of the facility with which malleable iron is machined, is the operation on the steering gear case. The core is drilled, counterbored and the cover face is faced in a combined operation at speeds up to 146 feet. No special tools are used, just standard high speed steel.

For transportation of heavy equipment and munitions, the army requires a giant truck with six driving wheels. It must be able to climb grades of 40 to 50 degrees and operate across territory that the average vehicle simply could not negotiate at all. In those malleable iron castings are used in many locations; notable being the large rear center spring supports and the front motor support.

Appreciate the Value

Army engineers well appreciate the value of the crawler type tractor where there is heavy work to be done and the traction is poor. Operating under the most adverse conditions, the tractor is subject to abuse similar to that encountered by the army tank. Many tough malleables go into tractor construction. Big massive castings are required, the individual weight of some running to several hundred pounds. Notable among the malleable castings used are the front idler guide, the track spring and equalizer spring guide, the sprocket drive carrier, the equalizer spring pad, the sprocket drive gear cover and the track spring retainer. These constitute an important tonnage going into defense production.

In machine gun mountings malleable iron castings again serve. These rapid fire pieces must be sturdily and yet flexibly supported. Whether for scout car or tank mounting or for tripod use, a malleable iron pintle cradles the gun so that it may be easily and rapidly aimed in any direction. Here, as in many other applications, the corrosion resistance of the material is a valuable asset in addition to its toughness and ease of machining.

In present day combat the limited range hand grenade of the first World War has largely given way to the 60 and 81 millimeter mortar. These weapons of which many thousands are being manufactured, can lob their bomb like projectiles into otherwise protected positions a scant hundred yards off—or send them soaring to an objective a good mile away.

Because of the strain and shock of fast fire the modern mortar must be strong. It is exposed to the elements so it must be corrosion-resistant and it gets rough treatment, so

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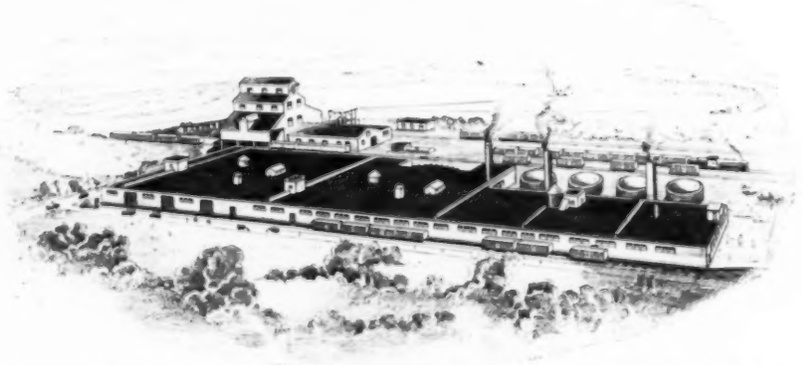

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it must be tough. Because it has all these qualities, malleable iron was chosen for the mortar parts. Easily machined, enabling faster production and the use of fewer machine tools, malleable iron is contributing much to the speed of the nation's defense work.

Management Course At Iowa City

The University of Iowa, Iowa City, Iowa, is offering for the third summer a special 3-week course for those interested in comprehensive training in production planning, routing and scheduling of work; motion and time study; layout of manufacturing equipment; waste elimination, and related subjects. The course will be held during June 9 to 27 at the university.

The course will be under the direction of Ralph M. Barnes. He will be assisted by six university instructors and lecturers and eight visiting managers and engineers from industry who will conduct forums on practical production problems. Teaching staff and university lecturers will include:

Ralph M. Barnes, director of summer management course, and professor of industrial engineering, College of Engineering, University of Iowa; J. V. Balch, research engineer and instructor in industrial engineering, College of Engineering, University of Iowa; Lee S. Whitson, industrial engineer, Minnesota Mining & Mfg. Co., St. Paul, Minn.; J. P. McClintock, staff engineer, McKinsey, Kearney & Co., Chicago; A. C. Baird, professor of speech, College of Liberal Arts, University of Iowa; Lester Thonssen, professor of speech, College of the City of New York, New York; W. L. Daykin, assistant professor of economics, College of Commerce, University of Iowa. (Lecture on Labor's Attitude Toward Cost Reduction Work); Dewey Stuit, associate professor of psychology, College of Liberal Arts, University of Iowa. (Lecture on the Use of Tests in Employment Procedures,) and C. M. Updegraff, professor of law, College of Law, University of Iowa. (Lecture on The Federal Government and Labor Law.)

Visiting lecturers and forum leaders include: John A. Aldridge, executive operating staff, Sears, Roebuck & Co., Chicago. (Lecture on Motion Study in the Field of Distribution); L. A. Bradley, manager, University of Iowa Laundry, Iowa City. (Lecture on Motion Study Applications in the Commercial Laundry); W. E. Crotsley, production manager, International Business Corp., Endicott, N. Y. (Lecture on Methods of Production Control); Lillian M. Gilbreth, president, Gilbreth Inc., Montclair, N. J., and professor of management, Purdue University, Lafayette, Ind. (Lecture on Motion Study To-day); W. F. Heising, superintendent of manufacturing, W. A. Sheaffer Pen Co., Fort Madison, Iowa. (Lecture on Stabilization of Employment), and J. K. Louden, director of industrial engineering, the National Supply Co., Pittsburgh. (Lecture on The Place of a Wage Incentive System in an Industrial Engineering Program).

Rein & Webster, Inc., Cleveland, have been appointed agents for the Howard Foundry Co., Chicago, producer of nonferrous castings.

Issues Index

American Foundrymen's Association recently has issued a general index covering the *Transactions* of the association, Vol. 38 to 48, for the years 1930 to 1940 inclusive. This is the third index to the bound volumes of the *Transactions* and brings the references up to date. The first was published in 1921 and covered the contents of Vols. 9 to 19 (1900-1921). The second issued in 1930 supplied a key to Vols. 30 to 37 (1922-1929). This latest index, 93 pages 6 x 9 inches, is similar in binding and appearance to former issues and to the *Transactions* volumes.

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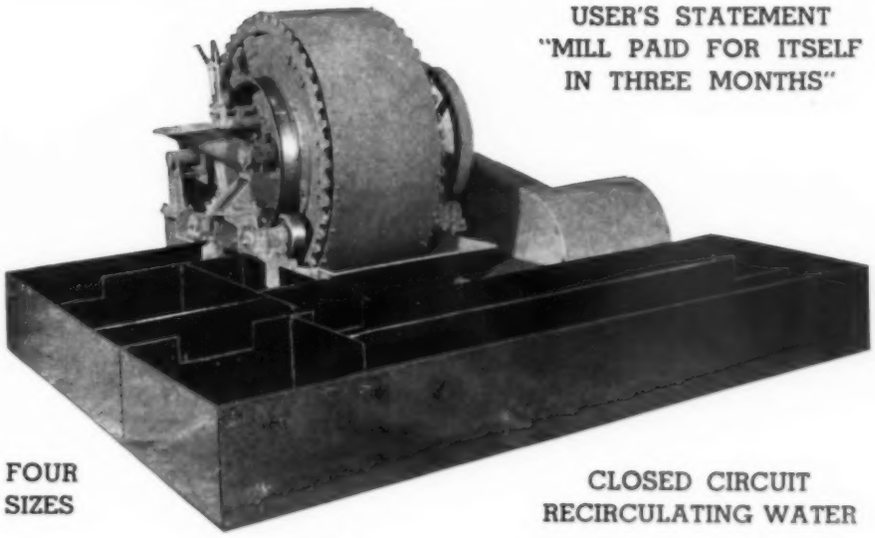

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A.F.A. AWARDS FOUR GOLD MEDALS

(*Continued from page* 79)

League Club, Chicago, and represents the A.F.A. in its affiliated memberships.

Max Kuniansky, general manager, Lynchburg Foundry Co., Lynchburg, Va., is noted for his outstanding contributions to developments in the gray iron industry and for his many contributions on technical processes through papers and committee work of the A.F.A. He has served on the committees of the gray iron division of the association, committee on pig iron qualities, committee on recommended practices for cupola mixtures, etc. At present he is chairman of the subcommittee on scrap of the cupola research committee. He is a director of the Chesapeake Chapter and on many occasions has presented addresses before chapters of the association and before annual convention sessions.

Mr. Kuniansky was born March 30, 1899, in Russia and came to the United States in 1907. He was graduated from the Georgia School of Technology in 1919 with the degree of bachelor of science in engineering chemistry. From 1917 to 1923 he was connected for varying periods with the former Aetna Explosives Co., now the Hercules Powder Co., at the Birmingham, Ala., and Ishpeming, Mich., plants; the National Malleable Castings Co., at the Grant works in Chicago, and with the American Cast Iron Pipe Co., Birmingham. He was chief chemist of the Lynchburg Foundry Co., Lynchburg, Va., from 1923 to 1928, when he was appointed works manager. Later he became general manager of the company with headquarters at Lynchburg. In addition to his activities in the A.F.A., Mr. Kuniansky has been prominent in the work of other technical and professional associations, particularly the American Society for Testing Materials.

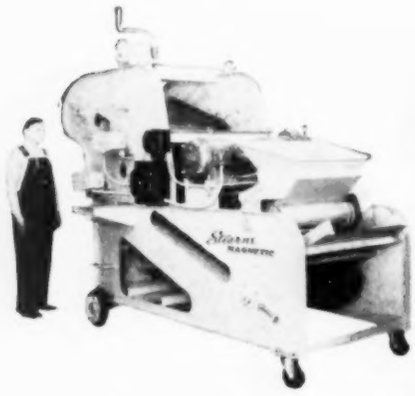
Donald J. Reese, was born in Wilkes-Barre, Pa., and received his earlier education at the Boy's High School, Reading, Pa. His first position was that of chemist for McCord & Co., Chicago. Later he accepted a similar position with the Wilson Foundry & Machine Co., Pontiac, Mich., and in 1920 became associated with the Whiting Corp. After a year of service, he entered the University of Michigan, Ann Arbor, Mich., and was graduated in 1925 with a degree of bachelor of science in chemical engineering.

Had Varied Experience

Returning to the Whiting Corp., he was made foundry engineer and later foundry superintendent. In 1926 he became metallurgist, Grindle Fuel Equipment division of that firm. In 1928 he was transferred to the firm's Chicago office for a year and then returned to the plant to engage in sales engineering work. In 1937 he accepted his present position, foundry research engineer, Research & Development division, International Nickel Co., New York.

Mr. Reese has written numerous technical articles and is an active member of the A.F.A. and the American Society for Metals. In connection with the A.F.A. he has a unique record in that he was the first chairman of the Chicago Chapter A.F.A., the first chapter organized. He also was the first chairman of the Metropolitan Chapter. He has addressed practically every chapter of the association and in many cases has been a repeat speaker before these groups. His particular field of development has been improvement of cupola melting practice in which he has made an outstanding reputation.

Fred L. Wolf, technical director, Ohio Brass Co., Mansfield, O., is and for many years has been one of the



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most active A.F.A. workers. He has served as a member of the sand research executive committee and committee on conservation and reclamation, also as representative of the A.F.A. nonferrous division. He has also served on the malleable division advisory committee and the handbook committee. In addition, he has served as chairman of the committee on specifications for nonferrous metals, A.F.A. representative on A.S.T.M. special committee on promotion of general use of specifications for copper alloys in ingots and A.F.A. representative on A.S.T.M. committees B-2 on nonferrous metals and alloys, and B-5, subcommitee II. He has presented numerous papers on nonferrous and malleable subjects.

Born May 13, 1885, in Elmore, O., he acquired an early education there in the public schools and in Toledo, O., and was graduated from the University of Michigan in 1908 with a bachelor of science degree in chemical enginering. He spent two years at Cobalt, Ont., in charge of development work on mining claims, and became associated with the Ohio Brass Co. in 1911 as chemist. He was a member of the executive committee of the A.I.M.E., Institute of Metals division, and a member of the A.S.S.T., A.S.T.M., American Chemical Society, American Electrochemical Society and the British Institute of Metals, and is prominent in committee work of the A.S.T.M. and the American Electric Railway Association. Mr. Wolf has been a prolific writer on many industrial subjects, for association meetings and technical press.

Book Review

Time and Motion Study and Formulas for Wage Incentives; by Stewart M. Lowry, Harold B. Maynard and G. J. Stegemerten; cloth; 432 pages 6 x 9 inches; published by McGraw-Hill Book Co., Inc., New York, and is available for $5.

This is the third edition of a work under the joint authorship of three men prominent in the industrial field. The book is an exceptionally complete hand book and guide on the principles and methods of making time and motion studies and time formula construction. It presents every thing necessary to develop a practical working system that may be applied to any industry. Explains the use of simple and inexpensive apparatus to secure quick results and operating with the least amount of interference with production or with the mental attitude of the workmen. It contains 35 chapters of which the first four cover economic necessity for measurement of labor, aims, fundamentals and development of time study; qualifications of a successful time-study man, and elements of time study.

The next ten deal with use and construction of process charts; operation analysis; basic divisions of accomplishment; laws of motion economy and their corollaries; characteristics of motions; motion pictures for time study; film analysis procedure; standardizing the job; time study equipment and observations. Other chapters relate to such topics as information; skill; effort; computation and summary; determination of standard times by levelling; allowances allowed time; studying existing conditions; using time study; principles of formula construction; general analysis and study; collecting and tabulating data; classifying operations and determining constants and variables; formula expression; testing and selling the formula; formula report; clerical routine; formula-revision procedure; formula for panel mounting; formula for lathe, and formula for alloy castings molded on bench.

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GATING OF CASTINGS IS IMPORTANT

(*Continued from page* 93)

the runner has to flow backwards as discussed previously.

While the illustrations relate to small round bushings or bearings or possibly solid pieces of comparatively small size that could be attached to a central gate, the same principles on proper connecting gates should be applicable to castings of other designs of approximately the same size.

With larger bushings such as long bushings or bearings that would take up the entire length of a flask, the gating becomes a little different since the cooling problem develops other considerations to be taken into account. In Fig. 30 are illustrated a number of ways to gate two large bushings or castings of similar size from a central runner. At *A* is a plan view of two bushings attached by a return gate by two different methods. One gate enters from the end of the bushing so that sawing can be done against the straight end of the bushing. As illustrated by the dotted line the gate enters from the side of the bushing. The runner has the usual blind end to take care of the first influx of metal into the mold but the runner also has a restriction at a point as indicated in the upper sketch of Fig. 30.

The restriction governs the flow of metal into the mold. A little study of the right amount of flow for a given casting will determine the size of the restriction to be used in the runner. That insures keeping the sprue full, a very important point, and also avoids the squirting of the metal into the mold which may develop scum and other types of defects. Some foundrymen use a horn gate—in this runner the small end of the horn gate becoming the restricted point to govern the amount of flow.

At *A* no provision is shown for feeding the casting as it cools. However, if the metal being cast is such as to require definite feeding, then large enough risers should be located to take care of this problem in the position central to the runner and above the gates leading to the two castings.

Remove Riser and Gate

In *C* is shown another way of casting two bushings by extending the length of the bushing the width of the gate. Then in the cooling room the operator saws through at the dotted line *S* straight across the bushing, removing the riser and the extension with one straight sawing operation. Another way of gating indicated shows the sprue leading to a gate that goes across the mold and backs up to feed the metal into the riser and through the riser to the castings.

Another way of gating the same mold would be to locate the sprue at the other end of the mold and run the full length of the mold to the riser as indicated in the dotted lines marked *alternate method of gating*. Such a long gate should have the same type of restriction applying to it as the case of *A* or else the force of flow of metal into the mold may be such as to form defects which may cause rejection. The restrictions should be located far enough from the mold cavity to allow the metal to quiet down after passing through the restrictions.

Large bushings, particularly those of relatively thin section are assumed to be large enough to be made individually in a flask and therefore, the gating would be somewhat different than that discussed where two bushings are located in the same mold. Such a bushing is shown in Fig. 31. The bushing might be cast in several alloys. Some of the low shrinkage alloys as 85-5-5-5 might not require

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any feeding riser other than ample size of gates.

If the bushings must be made from some compositions requiring feeding that may be accomplished in several ways. One not commonly used but which has proved effective in some instances where other methods failed is indicated. It consists of a long riser head above the crown of the circular bushing connected with the casting by a web of sufficient thickness and proper fillets to insure the riser heads feeding the casting until after the casting has set. That is similar to the method of casting test bars with a web connecting the necessary feeding head along the entire length of the bar; a common practice almost universally adopted to insure the proper feeding of the test bars.

In that instance a suggestion for a gate connected through a spray gate to the casting is shown. The gate is connected by the previously described back-up connection with the runner. It will be found desirable also to apply the usual restriction, as previously described, to this runner, particularly if the bushing happens to have a thin wall and consequently a minimum amount of stock is to be machined off.

Bells Gated on Top

Another interesting instance of special types of gating is that of bells. Large bells running from the locomotive bell up are usually cast with the mouth down and sometimes poured from the top as illustrated in Fig. 32 at *B*. The metal rushes down in several divided streams over the core that forms the inside and finally as the mold fills these several streams unite. Therefore, the metal must be poured hot enough to insure the proper uniting of these streams. Finally as the mold fills the riser illustrated is the last to fill and consequently is the last to cool.

However, many foundrymen have found it desirable to cast these bells from the bottom by attaching a gate as illustrated in *A* at the lip of the bell. A riser is attached at the top through which the metal is flowed off by pouring an ample supply of bell metal through the sprue and washing it through the flow off with a reasonable quantity of metal from the risers, thus developing a more or less uniform temperature of metal throughout the casting.

Another method with this same gating is to place the mold in a sloping position as illustrated at *C*. The metal entering through the sprue and the spray gate outlined in *D* flows around the lip of the bell and gradually rising, finally reaches the riser. This effects a temperature gradient and leaves the final metal to cool in the riser. The most desirable condition is the proper feeding of the casting and it is also desirable to flow off some metal through the riser as previously described. Obviously the metal diagonally across the mold from the spray gate is going to be somewhat colder than that on the gate side unless a flow-off operation is carried out.

Another type of problem that is giving the foundrymen opportunities for discussion is illustrated in Fig. 33 which refers to flat plates or disks. Since flat surfaces are somewhat difficult to cast perfectly due to the metal not lying quietly on a surface of green sand thought must be given to the proper temperature gradient and the consequent arrangement of gates.

At *A* is illustrated a round disk in plan and at *B* the elevation. It will be noted that the riser is on the opposite side of the disk from the spray gate and that *B* shows an inclined position. That is a successful method of casting flat plates or disks and where the alloy being cast is such that it requires feeding such a method will insure good feeding conditions if the size of the riser is correct. At *C* is illustrated a similar disk cast on edge with the gating illustrated in *D* entering

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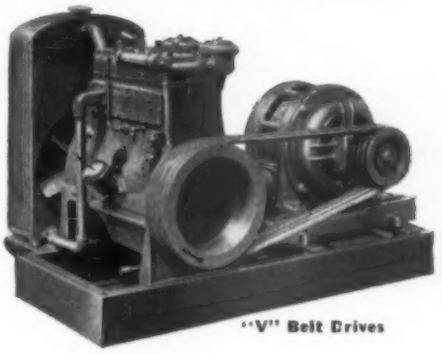

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through the sprue and runner through a back-up gate to the edge of the disk as shown in *E* in plan for two of such disks.

Many times several disks are connected to the same runner. The size of runner, the size of restriction in the runner, and the size and shape of the gates connecting it to the castings must be studied and planned so that a uniform, ample flow of metal is available to all cavities. Risers should be of correct size to insure proper feeding and their height above the casting must be such as to develop the necessary force to drive the metal into the casting during the feeding operation.

In Fig. 34 is suggested a similar application of gating and risers to square plates instead of round disks as in Fig. 33. Square or rectangular plates are often cast on edge and gated as illustrated at *A* and *B* and sometimes it is desirable to connect the gate with the riser as illustrated in the dotted lines. Plates also are cast flat successfully but the molds usually are inclined so that the metal has to run up hill, as shown at *C* and *D*.

Plan Gating System

Obviously many castings are made up of round parts connected with flat parts and logically might be construed as being a combination of those two. That is illustrated in Fig. 35 at *A* and *B* showing a bushing with a flange on the end and at *C* a tee or a valve body with flanges. In mapping out the gating for such pieces the gating illustrated for flat plates and bushings, should be combined to fit the job.

A careful study of the thickness of wall, the thickness of the junction of thin wall and thick section or the junction of flat plate and round bushing should be considered carefully when studying the proper location for gates and for feeding risers. Fig. 38 illustrates a square box which is simply a combination of several flat plates but the corners where these flat plates join become an additional problem over and above that of the straight flat plate. Consequently, the location of runners, gates and their size, the location of risers and the size of the connecting gate from the casting to the riser must be planned carefully if best results are to be maintained, particularly if high shrinkage alloys are being used. It might be well also to emphasize here the advisability of rounding corners wherever the design will permit.

Attention is directed to the fact that the illustrations simply indicate direction of flow, type of connection and type of riser rather than size or shape. Obviously size and shape will vary with alloy being cast and design of casting being made. Study the size of gate carefully because it not only influences the force with which the metal enters the mold and the capacity of the metal to feed that part of the casting to which it is attached, but also becomes additional expense in the cleaning room if it is larger than necessary. Therefore, good practice dictates the careful planning of right size of gate, the right size of riser and the right size of connecting gate between riser and casting that will insure the best castings with a minimum of cost for the removal of these gates and risers in the cleaning room.

This is the seventh of a series of articles on gating nonferrous castings. The first six articles appeared in the November and December, 1940, and the January, February, March, and April, 1941, issues.

THE EDITORS

Book Review

Minerals Year Book, Review of 1939; cloth, 1514 pages 6 x 9 inches; compiled under the supervision H. Herbert Hughes, Economics and Statistics Branch, United States Department of the Interior and available for $2.00 through the superintendent of documents, Washington, D. C.

Record of developments and trends in the mineral industry of the United States is set forth with statistical detail and analysis in this 1940 edition of this book prepared by the Bureau of Mines for the information and guidance of industry, government and the general public. The current volume is the latest product of a program of voluntary co-operation of industry with government inaugurated more than 70 years ago and maintained without interruption for the past 60 years. The report includes the economical and statistical data essential for effective planning of future operations of the mineral industry and for the formation of government policy with respect to the irreplaceable mineral resources of the country. For the first time the report also includes reliable current information on inventories and rate of use of iron and steel scrap. The material is presented in three general divisions, metals, non metals and mine safety. A 19 page index at the back adds considerably to the value of the book.

Electro Metallurgical Co., a unit of Union Carbide & Carbon Corp., has acquired a site for a new plant at Portland, Ore. Construction will start in the near future. The plant will be designed to manufacture ferrosilicon and calcium carbide. In addition, as demand develops and as local supplies of chrome and manganese ores become available in commercial quantities, manganese and chrome bearing alloys also can be produced.

NONFERROUS SAND CASTINGS FOR AIRCRAFT

(*Continued from page* 83)

tities and remelted for pouring the castings. By using metal already alloyed, it is necessary to leave the metal in the furnace only long enough to bring it up to heat, thereby eliminating the time required for alloying the metal. That makes it possible to obtain considerably more melts from each furnace. However, other alloys are made in the foundry from the base metals. All of the aluminum alloys are melted in oil-fired, pot-type tilting furnaces of 400 to 1000 pounds capacity.

Copper base alloys which include heat treatable nickel bronzes, phosphorus and high lead bearing bronzes, manganese bronze, aluminum bronzes, brasses and the like mostly are alloyed in the foundry, pigged and remelted when ready for pouring. The temperature of these melts, as well as the aluminum and magnesium alloy melts, are controlled with immersion pyrometers.

Castings Are Marked

After removal from the molds the castings are marked with a melt number and then are transported on a hand truck to the sawing department where the gates and risers are cut from the castings with band saws or abrasive wheels. Since a large percentage of the metal used in pouring an aluminum or magnesium casting remains in the gates or risers it is necessary to make use of the metal in future melts. All gates and risers must, therefore, be identified or kept separate. This is accomplished by dabbing the risers with paint of an identifying color. Metal tabs or the wire of a paper tag, inserted in the riser of aluminum or magnesium castings before solidifying, are also methods of identification, generally used for melt numbers. This procedure has eliminated entirely any mix-up as to the composition of the risers, or the melt numbers of the castings.

From the sawing department the castings are transported in fiber barrels, equipped with casters, to the grinding department, where the risers and parting lines are smoothed off with abrasive wheels or air chisels, and the remaining surfaces are brushed free of sand.

After trimming and cleaning, the castings are separated into size, alloy and heat treatment classifications, stamped with heat numbers and loaded into the heat treating furnaces. There are four high temperature (1000 degrees Fahr.) solution treatment furnaces equipped with a hot water quenching tank. Three of those are 75 kilowatt furnaces supplied by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and the fourth is a 125 kilowatt furnace made by W. S. Rockwell Co., New York. Aging is done in a 40 kilowatt, 450 degrees Fahr., rack type oven made by Gehnrich & Gehnrich Inc., Woodside, Long Island. These are used for heat treating the magnesium and aluminum castings.

For solution treatment, the castings are loaded on circular cages of approximately 900 pounds capacity, which are lowered into the open top furnaces, where they remain for a period of several hours. The quenching of aluminum castings, which must be completed within two minutes after opening the furnace, is accomplished by lifting the cake from the furnace with a high speed air hoist and rapidly immersing it in the hot water bath. One quenching bath is sufficient to take care of the four furnaces. However, to do that, the bath is situated with two furnaces on either side so as to shorten the distance and the time between the furnace and the quench. The aging ovens are of the car type, equipped with circulating fans for distributing the heated air uniformly throughout the ovens.

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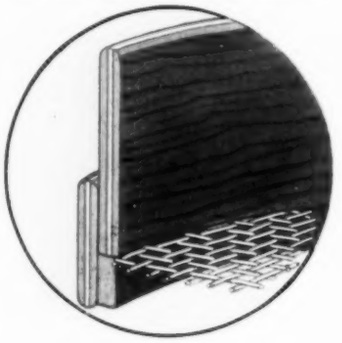

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heat treatment, is the final cleaning operation and is done either in blast tumbling equipment made by the American Foundry Equipment Co., Mishawaka, Wis., or by hand in an installation made by the Pangborn Corp., Hagerstown, Md., depending upon the size and design of the castings. Immediately following the shot blast, the aluminum and magnesium castings are given a corrosion protective coating. The chromic acid or sulphuric acid (Alumilite) anodic processes are used for the aluminum castings and the sodium dichromate (chrome) pickle treatment is used for magnesium.

The anodizing processes for the corrosion protection of aluminum are essentially the same, both processes forming an unbroken oxide film on the aluminum by electro-chemical reactions. The chrome pickle treatment is a chemical dip which passivates and slightly etches the surface of the magnesium. The rough castings are given these treatments to protect them against corrosion until they are machined.

Since a large percentage of the cast surfaces are removed during machining it is necessary to repeat the treatments after finish machining and prior to painting the parts. These surface treatments are followed with a light lanolin oil dip to further protect the metal from corrosion. This additional treatment is necessary where there is a possibility of the anodic or dichromate film becoming abraded through handling.

Molds containing tensile test bars and chemical coupons are prepared and cast with each melt. The chemical coupon is submitted to the chemical laboratory for analysis as soon as it is knocked from the mold. The tensile test bars are kept with the castings through the heat treatments and submitted to the laboratory for tensile test. At the same time the castings are sent to the inspection department, where they are inspected and remain until approved and released for shipment by the metallurgical department.

Book Review

Nonferrous Foundry Practice, by J. Laing and R. T. Rolfe, cloth, 336 pages, 5⅜ x 8½ inches, published by D. Van Nostrand Co., New York, and available for $6.

This interesting book is a valuable addition to the literature relating to the nonferrous foundry field, and is well worthwhile studying by every nonferrous foundryman, and those engineers and designers concerned with nonferrous castings. However, it should be pointed out that those whose conception of the term *foundry practice* limits it to details of melting and molding phases, may be disappointed since the term is much broader covering the characteristics and metallurgy of the metals and alloys as well as their founding.

Since successful production of satisfactory nonferrous castings in many cases depends primarily upon proper metallurgical technique, the authors have emphasized that phase by devoting the greater portion of the book to a discussion of the constitution and properties, compositions and mechanical test requirements, effects of additions and impurities, metallurgy, and uses. Melting and molding phases are given attention from the practical viewpoint covering the essential principles and precautions to be pursued in the production of sound castings. It also should be mentioned that the book is by British authors, and some of the practices employed are not followed in this country.

The book is divided into 11 chapters of which the first two discuss briefly nonferrous molding sands and melting furnaces. While the sands mentioned are British, and mean little to foundrymen here, the information on sand properties is applicable. Chapter III devoted to bronzes is the most extensive in the book occupying 112 pages of which about 30 pages relate to molding. Also the major portion of the chapter is devoted to a discussion of the 88-10-2 alloy and its modifications.

Chapter IV is concerned with copper and straight brasses while chapter V discusses high tensile brasses and manganese bronze. Aluminum bronze is the subject of chapter VI, and chapter VII is devoted to silicon bronzes and brasses. Chapters VIII and IX discuss nickel-zinc and copper-nickel alloys and the closing chapters X and XI pertain to aluminum alloys and magnesium alloys.

First part of each chapter discusses constitution and properties of the alloy or alloys under consideration the composition and mechanical test requirements with reference to existing specifications, effects of additional elements and impurities, metallurgy and uses, while the remainder of the chapter relates to melting and molding. That is a logical arrangement, and makes it easy for the reader to grasp the essential points as he progresses through the chapter, and why certain precautions must be observed in melting and molding technique.

A Correction

On page 50 of the April issue under the heading "Want To Make Pure Copper Hammers" one composition is given as containing 25% copper and 5% zinc. That is in error, and the correct composition is 95% copper and 5% zinc.

STEEL CASTINGS MEET REQUIREMENTS

(*Concluded from page* 87)

to castings and individually, or as the inspection department may require.

In Fig. 6 showing test bars it may be observed that they are designed with the idea of eliminating center line weakness. In developing the single cast test bar, the spoke type of bar has proved the most successful by actual experience. It is true that there is a possibility of gas segregation in the cope of the bar but that can be removed as the bar is longer than necessary. Table III shows the listings of the record of the West Steel Casting Co. over the past few years. It is self explanatory but sometimes the question has been asked just how many heats a week or a month were government inspected work.

A typical Navy specification Class D-49Slj for steel castings has been

Table III

Heat Record

Year	Government Heats
1936	37
1937	14
1938	13
1939	152
1940	40

selected and the physical and chemical properties obtained are presented in Table II. The physical and chemical properties given in Table II are not necessarily in correct order and no relation between the two is designed to exist. They are simply 15 typical physical properties that have met the specifications and 15 chemical compositions that have passed.

It would be of little value at this time to include the whole specification and in case of doubt it would be well to reread the specification herein suggested before forming an opinion on this article. Many things are said in the specification that experience has taught us to abide by.

The inspection department should be notified at least 24 hours before a heat is poured, giving the order number, company name, part number, number of pieces involved and the approximate time of heat. After the inspector arrives stay as closely to the letter of the specification as possible and remember the inspector is just as much interested as you are in seeing that the government receives quality castings without undue delays. A few of the statements taken directly from the specifications are as follows:

"Castings should be fully annealed by heating to the proper temperature and holding at temperature at least one hour per inch of thickness and slowly cooling in the furnace. Castings weighing 1500 pounds or less may be normalized and tempered. The tempering temperature shall not be less than 1200 degrees Fahr. and the casting must be furnace cooled to 300 degrees Fahr."

A second heat treatment on most castings besides those that fall into class *B* would seem desirable. That can be another anneal or preferably a very high *draw* treatment. That is particularly effective using the phraseology of the second option stating castings weighing 1500 pounds or less may be normalized and tempered.

This article was prepared with the thought of stimulating discussion on a subject that is very timely. If from this article or any of the discussion that may follow one steel foundryman has been helped in the manufacture of steel castings to meet government specifications the author believes the effort has been worth while. With our national defense program demanding more of the steel foundries, in quality as well as quantity, discussions of this type ought to help us all and in turn benefit our national preparedness program.

Book Review

Transactions of the American Foundrymen's Association, Vol. 48, 1940, edited by R. E. Kennedy, and N. F. Hindle, cloth, 815 pages, 6 x 9 inches, published by the American Foundrymen's Association, 222 West Adams street, Chicago, and available for $3.00 to members and $15.00 to nonmembers of the association.

This annual volume of the American Foundrymen's Association contains 32 papers with discussion and three-committee reports which were presented at its forty-fourth annual meeting in Chicago during May 6 to 10, 1940. In addition, the forepart of the volume is devoted to a summary of proceedings of the meeting, reports of officers, financial statement and minutes of board meetings. The papers published cover a wide range of subjects relating to the four branches of the foundry industry, namely: Gray iron, steel, malleable cast iron, and non-ferrous. Other papers relate to molding sand, clays, refractories, coatings for wood patterns, welding, and numerous other phases relating to the foundry industry. Papers deal with both the practical and technical sides.

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